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ASPHALT PAVING*

Factors in Construction, Maintenance and Cost

THE first asphalt pavement in the world was laid in the city of Paris about fifty-one years ago. About six million square yards, or about three hundred linear miles, of European streets are now paved with that material.

Twenty-five years ago about twelve miles, or less than one-fifth of one per cent. of the paved streets of the cities of the United States, were paved with asphalt. To-day, about twenty-five hundred miles of streets in the United States, embracing an area approximating forty-four millions square yards, are paved with asphalt. This represents, in first cost, an investment of $100,000,000 and, including the cost of repairs and re-surfacing, a total outlay of not less than $150,000,000.

Independent of the materials used for re-surfacing and maintenance, the materials comprising the asphalt pavements of the cities of the United States would fill over one million cars, enough to make a train six thousand miles long, extending from New York to San Francisco and back, aggregating twenty-two million tons.

Classifying by percentages, the materials comprising an asphalt pavement of 6-inch concrete base, 1½-inch binder and 2 inches of asphalt topping, as usually laid, will run approximately as follows: Stone, 52.1 per cent.; sand, 34.4 per cent.; cement, 6.3 per cent.; stone dust, 3.3 per cent.; asphalt, 3.3 per cent., and oil 0.6 per cent. Thus it will be seen that asphalt forms not exceeding 3.3 per cent. of the materials of an American asphalt pavement, and ranges as low as 1.8 per cent. when asphalts rich in bitumen are used. Fully 90 per cent. of the American asphalt pavements may be termed an artificial bituminous sandstone, the wearing surface being 90 per cent. sand and 10 per cent. bituminous mastic.

The European asphalts, until within a few years ago, were all made from the crushed powder of a natural limestone, of which 90 per cent. is very finely crushed limestone and 10 per cent. is bituminous mastic. These asphalts were compact, but very slippery, the gradients upon which they can be used being limited in consequence. This, in the early literature upon asphalt pavements, gave rise to the statement that they could not be used upon greater than 2 per cent. grades. Experience has demonstrated that the American asphalt pavements are practicable for any traffic upon grades up to 5 per cent., and with short sections at intervals upon grades very much steeper, in fact, as steep as 12 per cent.

The author proceeds to refer to the early use of asphalt as a paving material and to the practical limitations of its supply for the United States to a portion of Trinidad Island. In 1893, however, he prepared specifications for the city of Omaha, admitting all asphalts under the usual bond and guarantee provisions. The coöperation of other cities rendered futile the opposition to open specifications, and "the cost of paving dropped, in 1895 and 1897, in many localities fully 60 per cent." In addition, a keener knowledge of the whole subject has been gained, and "good pavements are now made from artificial asphalts produced from residuums of the California oils, and also from asphalts from Venezuela, Cuba and numerous other sources." The paper continues as follows:

The engineering profession has, in the past decade, also been admitted into the secret sanctuaries of the laboratories, and has discovered that, aside from the shape of the streets and the asphalt used, the sand, which constitutes 90 per cent. of the surface covering, exerts very much influence upon the result. Numerous analyses of poor pavements have shown that it was not always wise to let the bidders make specifications, and that many important requisites should be provided for in the specifications. In place of 6 and 7 per cent. of bitumen in the asphalt mixtures, frequently found in poor pavements of our cities, it has been demonstrated that good pavements should have at least 10 per cent. of bitumen. This applies equally to bituminous limestone pavements and

* Paper (condensed) read before the League of American Municipalities Convention, held at Toledo, Ohio, August 23-25, by Andrew Rosewater, Mem. Amer. Soc. C. E., City Engineer, Omaha, Neb.

to bituminous sandstone pavements. Careful study of the requisites further shows that the more compact any pavement is the better its wearing qualities; it is found essential, to secure the minimum of voids in the sand, that the grains should be so graded as to admit of packing, and, finally, after this, the further addition of fine powdered "filler" will make the mass still more compact. Stone dust has been and is largely used for this purpose, but in larger quantities than in years past, and as an improvement finely ground Portland cement is being substituted in place of the stone dust. This has been used, with evidently very excellent results, on the Fifth avenue pavements in New York and those of London, and the same filler was used on Sixteenth street, the leading thoroughfare of Omaha, and is required in all pavements now laid in that city to an extent of not less than 5 per cent., and 12 per cent. will probably be required in the specifications hereafter. The difference in cost of a few cents per yard will not justify its exclusion on economical grounds.

After some remarks on the essentials of a proper base, particularly in regard to earth road-beds, the author proceeds thus:

Divested of all verbiage, a pavement is a veneering, or wearing road surface, placed there to protect the base and give it durability. The early attempts at pavements were of the old Roman road order, consisting of layers of large blocks of stone in mortar, which distributed the load over a much wider area than that directly exposed to the tires of the wheels. To these roads succeeded numerous variations, such as slabs of granite laid in parallel rows for the wheels to run on, tram railways with iron or steel surfaces distributing their loads through the medium of ties or planks to the earth surface, and the macadam roads developed about one hundred years ago. These had depths of broken stone, varying with the traffic, and depended for their efficiency upon compacting the aggregates, first by the traffic, which took years, and later by great road-rolling machinery, which crushed and forced the various aggregates to a wedged and compact mass, developing a smooth surface.

It was contended, even by railway builders, that roadbeds should have a certain elasticity to be practical. It is now clearly demonstrated that the firmer and more unyielding the foundation the more durable it will be. The toughest steel, bent back and forth by continuous vibrations, will break. Rock foundations, yielding to compression impacts, will ultimately crush the particles, and the greater and more numerous the voids the quicker the change of shape and final destruction. The theory of the need of elastic foundations is erroneous—the elastic requisites should be in the springs of the carriages and rolling stock, and not in the road-bed. The construction of the so-called bitulithic pavement, which is really a macadam with a bituminous binder, recognizes the need of reducing voids by grading the aggregates so as to reduce the voids from 40 to below 20 per cent., and finally filling this 20 per cent. with tar or other bituminous binder.

In the construction of macadam pavements it is conceded that, next to the earth road, the need of a large crown is imperative. Why? For the same reason as in the case of an earth road, to shed water so as to minimize its destructive effect. Experience has demonstrated that, all things considered, the most economic covering for road purposes upon soil capable of immediate consolidation into monolith form is a concrete of sand, cement and stone. Unlike the old Roman road, this can be made more uniform with less material and skilled labor by the use of small broken stone, which, with various grades of sizes and the mortar of sand and cement, produces a compact and uniform mass.

The factors of a good asphalt pavement are:

1. A good sub-drained compacted base.

2. An intermediate monolithic material, preferably Portland cement concrete, to rest upon and transmit the load uniformly to the earth below.

3. An asphalt covering of wearing capacity capable of meeting all traffic conditions and of resisting the destructive agencies of extreme temperatures and other climatic influences.

To meet requisite No. 3 we are confronted with such varied and conflicting opinions that it becomes necessary to carefully analyze all pros and cons and impartially accept and reject what is respectively good and bad out of them. First of all, let us consider the governing elements.

1. The asphalt covering must be compact and hard enough at all times to meet traffic requirements.

2. It must not be readily affected by water.

3. It must be durable.

4. It must retain its smooth form and not become wavy.

5. It must not be slippery.

In order that requirement No. 1 be met, the component elements of the covering must be such as to become a solid voidless mass that can resist compression of traffic and expansion and contraction of temperature extremes.

Experience has shown that asphalt from Trinidad, Venezuela, California and numerous other sections of the country, 60 per cent. of whose bitumens are soluble in boiling naptha, possess sufficient adhesive cementing qualities to make a proper paving cement. Experience has further developed that the actual and necessary quantity of bitumen thus soluble to make a proper paving mixture shall range between the extremes of 10 and 13 per cent. by weight. The exact proportion will vary between these figures, dependent upon the nature of the sand grains and voids in the sand. The specifications should, to insure good results, provide that not less than 10 per cent. of bitumen shall be required in the mixture. This does not mean 10 per cent. of asphalt, for what is known as refined asphalt varies in the degree of refinement. Bermudez, Venezuela or California asphalts are, when refined or manufactured, free from sand or other mineral mixtures, and therefore contain from 95 to 99 per cent. of pure bitumen. The Trinidad asphalt, as refined, contains fine impalpable mineral powder to the extent of 36 per cent. In the latter case, it requires more asphalt to produce the 10 per cent. of bitumen, but, on the other hand, the amount of "filler" of stone dust or Portland cement required with this asphalt is proportionally less than with the others.

After pointing out certain fallacies in the methods sometimes adopted for comparing asphalts on the basis of the bitumen contained in each, the author re-urges the desirability, in the interests of the municipalities concerned, of adopting open specifications "providing for the minimum of

bitumen in the mixtures, subject to the boiling naphtha test, which determines the malthene or petrolene components." The paper then proceeds:

Another feature of considerable comment, upon which opinions are as varied as there are interests, is the claim of susceptibility of certain asphalts to the effects of moisture, and which, for that apparent reason, are used as a basis to exclude such asphalts and thereby favor certain contractors and punish others. From practical contact with the varied features of this question, I am led to regard specification provisions placing power in boards or officers of boards to discriminate on grounds of the above nature as far more dangerous to the honest public service than any possible shortcoming affecting the longevity of pavements from such alleged defects. The asphalt pavement does not exist which can withstand continued exposure under water without deterioration. Asphalt pavements when under water a length of time become more or less soft, and the great deterioration resulting from water upon asphalt pavements is due to the action of wheels and horses' hoofs upon the softened surface. Sandstones when wetted and exposed to abrasive forces act like grindstones, wearing away rapidly as the grinding goes on whilst being subjected to moisture. This is equally the case with the bituminous sandstone. Chief Inspector Dow, of Washington, who is perhaps the ablest exponent and originator of the dangerous clause giving preference to asphalt not readily affected by water, informed the author of this article last summer, when extending him many courtesies on an inspection tour of Washington pavements, that for the past seven years all gutters on asphalt paved street in the Capitol City had been paved with vitrified brick. Mr. Dow must have concluded that all asphalt deteriorated more rapidly when subjected to water influences and have had little faith in the theory that certain asphalts were not readily affected by water, or he would have urged the exclusion from use of asphalts alleged to be affected and then studiously avoided using those of preferred merit from gutters where they would be exposed to the influence of moisture.

Having disposed of the asphaltic features of the mixture, the equally and possibly more important mixture factor is the sand, which comprises approximately 90 per cent. of the asphalt covering. To bring forcibly to mind the sand factor, I need but cite a discussion at the recent International Congress of Engineers on the relative value of stones for macadam. One of the speakers, referring to sand stones, said it should not be forgotten that there are extreme differences in the quality of sand stones. No one who has observed sandstones from various quarries and localities can fail to be impressed with the truth of this statement. Yet few stop to think that sandstones are composed of grains of various grades of sands. That being the case, is it not evident that an asphalt paved surface—an artificial sandstone monolith covering—is as apt to vary in its qualities, owing to different gradings of sand, as the natural sandstone itself? Extended observations on this subject have clearly shown that to produce the best wearing mixtures sand of certain various graded grains give better results than other sands.

The problem of how to determine and secure the sand that will grade best and at the same time prove the toughest and most adaptable to wear, like the natural sandstone of the best quality, is still only partially solved. Independent of the sand and asphalt I have already outlined the need of a suitable filler. My information as to the use of Portland cement for this purpose, in place of the natural dust of carbonate of lime, was obtained from an interview with Mr. Clifford Richardson, who is doubtless the greatest living expert on asphalt pavements, taken in their entirety. His work entitled "The Modern Asphalt Pavement," which has since appeared, refers to the good results of a Portland cement filler, but disclaims an understanding of the reason why.

Having now outlined the general problems and factors of asphalt paving construction I will briefly outline the factors of maintenance and cost.

The history of municipal growth has shown it impossible to avoid the constant cutting up and other disturbance of the paved surfaces of urban streets: water-works, sewer and gas construction, and telegraph, electric light, telephone and other conduits of every kind are brought into demand with each new discovery and each new construction, and the problem of finding pavement that is permanent is as unsolvable as the "squaring of the circle."

The only feature of permanency existing in public works is that of permanency of repairs. In connection with asphalts, as well as other pavements, the economic lines are along those of prompt attention to the repairs before the cuts are enlarged by traffic. Twenty years of close observation of municipal conditions lead me to the conclusion that every city should have a plant and an organized corps of skilled men to attend to the maintenance and repair of their paved streets. Once equipped with the best of modern appliances, streets can be kept in a condition of continuous repair at the minimum cost. To do this, the construction and engineering departments must be divorced from partisan politics and placed under a permanent system of civil service.

In the short period of asphalt repairs conducted under the writer's supervision this year sufficient figures have been obtained to warrant the belief that at least 25 per cent. can be saved to the municipality by ownership of its own repair plant, and certainly 50 per cent. more comfort can be gained thereby and a still greater percentage of damage to vehicles avoided, not to speak of persons hurt. The same experience briefly developed at Omaha is reported by Mr. Proctor, the expert in charge of the Detroit plant, which has been in operation over one year.

The approximate relative cost of the various elements in an asphalt pavement, barring legal or other unnecessary avoidable expense, may be considered distributed about as follows:

Excavating and preparing earth road surface	7	per cent.
Concrete base	38	"
Binder, 1½ inches thick	14	"
Asphalt topping, 1½ inches	29	"
Plant use	5	"
Superintendence and miscellaneous	3	"
Contingencies	4	"
	100	"

Independent of these percentages of cost, two important factors materially affect the cost of asphalt paving:

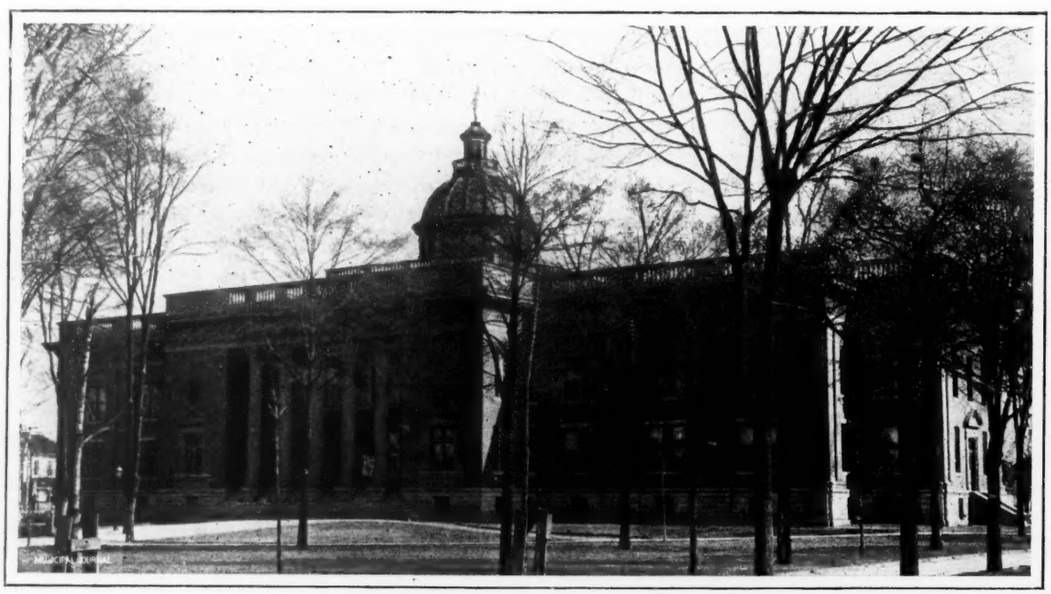
1. The legal provision for the work.
2. The directness of all provisions in specifications.

With reference to the legal provisions, every contractor, to avoid uncertainty and risk in undertaking work, should be protected by the knowledge that every necessary step required by law to be taken is clearly set out in the laws and ordinances and properly followed. Every step taken by the contractor through uncertainty as to these provisions is necessarily charged for to justify the risk. The cities of the country invariably pay dearly when their lawmakers, through incompetency or purposely, make ambiguous laws affecting public improvements.

The second factor, viz.: proper specifications, is equally as important as the first. If an engineer or board of public improvements makes a two-sided specification, whereby uncertainty exists as to the intent or future interpretation of any provision, the contractor feels exposed to the possibility of its operating against him by what is known as a "hold-up" process and makes provision in his bid accordingly. It is a very common thing to see provisions in asphalt specifications purposely or through ignorance so worded as to enable the municipal officials to exercise power in such a manner as to make or break a contractor with seemingly good cause. Every specification to bring about the best results for the city, both as to good work and economic prices, should designate unequivocally everything to be done and how it is to be done, and not, as is often worded, "as the engineer or board may determine." There is no excuse for half of the vague terms in ordinary specifications, and wherever they exist the municipality must ultimately pay for the faulty features. It is the business of the specifications to define every possible requisite directly, both as to kind, quality and extent of the materials required and how they shall be applied, and prices should be called for upon a specified basis for all extras that may possibly enter into the work. Every proposal should be based upon a designated list of materials as to quantity, which should form the basis for determining the lowest bidder, so as to remove the possibility of fraud or the suspicion that fraud may be practiced. Every contractor at the same time should understand that he will be required to perform what he agrees to do under his contract. With honest specifications only can the cities look for honest and economical work.

A last and not least important factor is the provision for payment. If a contractor must receive tax certificates and collect his pay from them, or some other bills payable upon which there hangs an uncertainty as to time of payment, he will invariably charge enough more for the cost of such risk and collection. The best and economic method is to provide for cash payment by the city, which is better able to raise money at low rates of bonded issue or by some equally good method. Such provision will be a material factor in reducing cost of paving.

In conclusion, and by way of supplying an omission under the head of maintenance, I deem it proper to add a suggestion relative to the durability of an asphalt pavement. It has been shown that water deteriorates all asphalts if continuously allowed to stand upon them. Asphalt pavements are practically impervious to water—the slightest depressions of even one-twentieth of an inch will hold moisture which to the eye makes the pavement frequently appear full of holes. The water upon asphalt streets will rapidly evaporate if simply the result of a rain or a periodical flushing, but the drenching of asphalt paved surfaces by continued hourly sprinkling leaves the surface constantly moist and, as a result, subject to rapid wear from traffic erosion. Asphalt streets should be swept, and not sprinkled, if they are to be economically used.



CITY HALL AND COUNTY COURTHOUSE, COLUMBUS, GA.

THE TORONTO STREET RAILWAY AGREEMENT*

A Member of the Board of Control on the Situation

THE Street Railway situation in Toronto may be summed up in a few words:—The service is operated by a corporation holding the franchise as a monopoly, under a thirty-year agreement, terminating in 1919. A single fare is five cents in cash or four cents by ticket, which pays for passage from any point to any other point in the system. There are about ninety-three miles of track. In return for the privileges it enjoys, the Company pays to the city more than one thousand dollars per day. This is, in brief, the result that is attained. The history and the details of the agreement under which the Company operates are the subjects of my short address this afternoon.

SOME EARLY HISTORY

The first grant of authority to construct and operate a street railway in the city of Toronto was made by an agreement dated March 26th, 1871, between the city council and a private party. It authorized the grantee to construct railways and operate them for a term of thirty years. Its conditions were very simple; the holder of the privilege was required to charge no higher fare than five cents, to keep that part of the roadway occupied by the railway in good repair, and to pay an annual license of five dollars for each car operated. The city retained the right to take over, at the end of the term, the ownership of all railways constructed under the agreement, and all real and personal property in connection with the working thereof, on payment of their value as determined by arbitration.

MAKING A CLEAN START

Shortly before the termination of this agreement, which expired in 1891, the city council, deeming it wise that a new contract should be made, entirely unhampered by any existing conditions, decided to take over the railway and its equipment. A by-law to enable the city to borrow money for this purpose was submitted to the electors and was ratified by a vote of 5385 in favor against 427 opposed. The city exercised its power, paying for the whole property the sum of $1,453,788, and advertised for tenders for a new contract.

Before dealing with the question of a new contract, the city council sent a committee on a tour of enquiry. This deputation visited many cities in the United States and obtained all possible information concerning the operation of street railways.

Tenders were asked for a service to be governed by specific conditions, which I shall presently explain. The tenderers were required to state the per-centage of gross earnings which, under the conditions set out, they would pay to the city in consideration of the privileges granted. The contract was to be for a term of thirty years.

PUBLIC OWNERSHIP TRIED BUT NOT CONTINUED

When the franchise and plant were advertised for sale there was a strong agitation in favor of the city's retaining and operating the system. The time that elapsed between the taking over, by the city, of the railway plant, as just stated, and the date of the new agreement, was three and a half months. During that period the railway was operated by the old management under the direction, on the responsibility, and at the cost of the city administration. The net result of that operation was a profit for the city of $45,444.06. This surplus remained after deduction of interest upon money invested, a fair expenditure for repairs of plant, reconstruction of tracks, and other charges of a similar character. This result led some members of the city council to advocate a continuance of civic management.

The plan proposed was the operation of the system under the direction of a commission appointed by the council. Public opinion in favor of municipal ownership was not then as fully developed as it is now. There arose in the public mind a suspicion that the agitation for civic ownership, in this particular case, had its origin in the desire of some municipal representatives to secure for themselves permanent positions. This suspicion developed into a hostility that was so general and so strongly expressed that the council refused to entertain the proposal and decided upon accepting the best of the tenders submitted.

The successful tenderers, a syndicate of prominent business men, subsequently transferred their rights to a joint stock company; their contract authorized this. The company organized for this purpose operates the service on the plan and under the conditions which I shall now summarize.

CONDITIONS OF NEW AGREEMENT

The Company took over the property which the city had purchased from the original owners of the franchise, paying therefor to the city the amount which the city had paid, and undertaking to add thereto all that would be necessary for the best obtainable service in the way of rolling stock and general equipment under the direction of the City Engineer.

The Company was required to build and equip a factory in the city for constructing and repairing all cars and railway plant used on the system, and to agree to continuously carry on such construction and repairing during the term of the agreement.

All cars, rails, ties, stringers, poles, wires, and all other plant and equipment and all the real property used in connection with the railway are provided, placed, maintained and owned by the Company. The city owns, constructs, and maintains both foundation and surface of all road-beds and pavements upon which tracks are laid.

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* Paper read before the League of American Municipalities Convention, held at Toledo, Ohio, August 23-25, by Mr. Francis S. Spence, Member of the Board of Control, Toronto, Canada.

The City Engineer, subject to the approval of the city council, prescribes the service to be given, making the time tables and setting out the rate of speed and other necessary conditions. The laying down of new tracks, the establishing of routes, and similar details are also prescribed by the City Engineer with the council's approval.

The Company is required to maintain the ties, stringers, rails, curves, etc., and must renew, remove or replace the same as circumstances may require and as the City Engineer may direct. If the Company desires to make any repairs or alterations to the ties, stringers, rails, etc., on paved streets, it is required to repave the portion of the roadway so torn up at its own expense.

The city has the right to take up and replace the streets traversed by the railway lines for the purpose of altering the grades thereof, constructing or repairing pavements, sewers, drains or conduits or for laying down or repairing water or gas pipes, or for all other purposes within the power of the Corporation, without being liable for any compensation or damage that may be occasioned to the working of the railway or the works connected therewith.

The Company is required to establish new lines and extend tracks and service on the recommendation of the City Engineer approved by the council, and must do so within a period fixed by a two-thirds vote of the council. The Company may not lay down any new line, nor extend any line without authority, nor open any new line for traffic until the City Engineer certifies that its construction is satisfactory to him.

The Company must keep the railway tracks clear of snow and ice. When the depth is less than six inches, the snow and ice removed may be spread evenly upon the adjoining portions of the roadway. If the depth exceeds six inches, all track allowances must still be cleared by the Company under the direction of the City Engineer, and all material removed must be deposited on such places, on or off the street, as he may order.

Cars are to be of the most approved design for service and comfort, including heating, lighting, signal appliances and number and route boards. No advertisements are permitted on the outside of them except with the authorization of the City Engineer.

Cars are not to be overcrowded, the City Engineer, with the council's approval, being authorized to prescribe the number of passengers to be carried by each car.

No person employed by the Company is to be required or permitted to work for more than ten hours in any day, nor for more than six days a week, nor for more than sixty hours in any week, and no adult employee may be paid less than fifteen cents per hour.

FARES TO BE PAID

The contract also fixes the charges to be made by the Company. Single cash fares are five cents each. Fares on cars running between midnight and 5.30 A. M. are double the day rates. Regular day tickets are sold at the rate of six for twenty-five cents, or twenty-five for a dollar. Limited tickets, to be used only between 5.30 and 8 A. M. and between 5 and 6.30 P. M. are sold at the rate of eight for twenty-five cents.

Tickets good at any hour on Sunday and during limited hours on other days are sold at the rate of seven for twenty-five cents. Children under nine years of age and school children of all ages are carried for half-fare. One fare carries a passenger from any street car point to any other street car point, no matter how many transfers are necessary. This transferring is well done. The longest trip thus taken for a four-cent fare is about nine miles. Policemen and firemen are carried free.

PAYMENTS TO THE CITY

The Company pays to the city a mileage of $800 per mile of single track or $1600 per mile of double track, plus a per-centage of the Company's gross receipts from passenger fares, freight, express and mail rates, and all other sources of revenue derived from the traffic obtained by the operation of the railway. The mileage payments are made quarterly. The per-centage of receipts is paid monthly, namely,—

On all gross receipts up to	$1,000,000	per annum...	8	per cent.				
Between	$1,000,000	and	1,500,000	"	"	...	10	" "
"	1,500,000	"	2,000,000	"	"	...	12	" "
"	2,000,000	"	3,000,000	"	"	...	15	" "
And on all gross receipts over			3,000,000	"	"	...	20	" "

All books, accounts and vouchers kept by the Company are subject to a monthly audit by an auditor appointed by the city council, and the Company is required to furnish all facilities for such audit.

A TERMINATING FRANCHISE

This contract terminates in 1919. The city may then make a new agreement with the Company at present holding the franchise, or with any other party or company, or may take over and operate the system. If the city proposes to operate the system, it must take over the Company's equipment as far as is necessary for the carrying on of the service, paying therefor a price, to be fixed by arbitration, in which the standard for the value of the equipment shall be its value as adapted for use in connection with the best street railway system then in operation.

A SUCESSFUL ENTERPRISE

Now that looks like a pretty good contract from the city's standpoint, and it was not a bad one for the other party. As has been said, the purchasers paid for the then existing equipment nearly one and a half million dollars. To complete their equipment they proceeded to issue bonds for about three and a half million dollars, bearing interest at from four and a half to six per cent.

The bonds and interest are a first charge upon the assets and the net earnings of the Company. These bonds practically provided for the greater part of the equipment of the undertaking. The equipment is being continually improved and so continues to represent the Company's bonded indebtedness, the interest being paid as part of the Company's working expenses.

The promoters of the enterprise then issued $6,600,000 of capital stock. This stock sold well. Only a small proportion of the money being needed for the equipment, the proceeds of the sale of the stock were mainly clear profit to the promoters. The stock represented little more than the earning power of the franchise, for which no direct payment had been made. You could hardly call it watered stock, it came nearer to being pure water. But the enormous earn-

ing power of the franchise pays dividends upon it. Last year the Company paid all its operating expenses—including interest on its bonds and salaries on a liberal scale—paid to the city the mileage and per-centage provided by the contract, paid a five per cent. dividend upon its stock, and carried to its surplus or accumulation accounts a balance of $218,078.89. The Company's stock is quoted to-day at 107 to 108.

It is hard to say just now what will happen to this stock as the term of the franchise which it represents grows shorter and shorter. One would naturally expect its value to grow less and less. That, however, does not concern the question I am discussing.

The City's Side of the Results

The facts I have stated show the great value of the franchise which the city surrendered to the company in consideration of being paid yearly a fractional part of the money which that franchise earns. Let us look at the city side of the contract.

The railway mileage is now 92.936 miles and the annual mileage payments thereon amount to $74,348.80.

The gross earnings of the company now exceed two million dollars per year and the per-centages paid to the city are:

Out of the first $2,000,000.....$190,000
Out of the balance.....15 per cent.

The street railway year for which we reckon the per-centage begins on September 1. Before July 1 of this year the two-million-dollar mark had been reached, and the city has already been paid 15 per cent. on all the July receipts. The city's actual revenue from this source for the month of July was therefore:

Mileage	$6,195.73
Per-centage	36,404.79
Total	$42,600.52

It will be seen that this is more than $1,000 per day, and the mileage and per-centage for the current calendar year will average more than $1,000 per day. The revenue derived from this source during the past ten years is as follows:

Year.	Mileage.	Per cent.	Total.
1896	60,000	78,922	138,922
1897	60,000	85,673	145,673
1898	64,000	98,631	162,631
1899	64,000	111,426	175,462
1900	64,000	127,128	191,128
1901	68,000	145,209	213,209
1902	70,274	165,173	235,447
1903	71,986	206,934	278,920
1904	73,873	249,511	323,384
1905 estimated	74,348	298,000	372,348

Contract or Ownership

Now a few words as to the general question of whether or not such a contract is the best method of dealing with such service as that of local transportation. It is more than probable, it is practically certain, that the revenue derived by our city from its street railway service is much greater than it would be if the railway were owned and operated by the city. Under the best attainable kind of public control the management of the enterprise would be to some extent political.

The laying down and the extension of lines, the fixing of fares, wages of employees and hours of work would be influenced by political considerations. Private management is more profitable than public management, though not always as satisfactory to the public.

Yet, notwithstanding our experience of the profitableness of our present arrangement and our experience of the difficulties and extravagances of public operation in other civic services, the general public opinion of our citizens to-day is in favor of civic ownership and operation of our street car system, and it is very likely that when the present contract expires the city will take over the railway and run it as a municipal enterprise. With your permission I will just briefly mention some of the reasons they have for this preference.

Enforcing a Contract

1.—The great difficulty, I might say the impossibility, of compelling a corporation to live up to its obligations. In this respect we have failed to some extent, and any success we have achieved has been the result of persistent and disagreeable fighting. We have had to take legal action against the Toronto Railway Company to compel it to pay mileage upon curves, switches and turnouts, which, it claimed, were not regular tracks; to compel it to substitute iron poles for dangerous and unsightly wooden ones; to compel it to bring its equipment up to date, using modern cars, fenders and brakes; to compel it to give a sufficient service; to compel it to obey the City Engineer's instructions regarding time tables and routes; to compel it to pay for snow cleaning; to prevent it from over-crowding cars; in short, to compel it to conform to nearly every part of its agreement which it thought it would pay to ignore.

We have had to enforce all these points of detail by tedious and vexatious litigation. We have had to go to the Legislature for special laws providing penalties for breaches of contract, and then to the courts again to enforce the penalties. Even to-day, though we have perhaps as fine a street car service as any similarly sized city on this continent, we have not as good a service as our contract demands. You cannot make a private corporation live up to its agreement. You can only have the street car service that you want when you absolutely control that street car service yourself.

Effect on City Government

2.—To secure good civic government there must be public interest. The apathy and indifference of right-purposed citizens is the curse of civic government to-day. If good citizens have much at stake in public affairs, they will pay more attention to public affairs, and to the kind of men who are charged with the administration of those affairs. The imposing of more responsibility upon municipal councils will raise the tone and character and ability of those councils. This is the simple answer to the allegation sometimes made that our municipal councils are not made up of men qualified to deal with such important enterprises.

Degrading Influences

3.—So-called "boodling" in civic politics is nearly always the result of the efforts of private contractors and franchise

holders to control municipal councils. Corporations seeking for franchises, or operating public services, strive to secure councils of their own creatures, and their success has sometimes almost made the name of "alderman" a word of reproach, and the term "civic administration" a synonym for dishonesty and corruptness. Abolish the franchise-contract system, with other such opportunities for public plundering, and the boodler will have no desire to go into civic politics, and no one else will want to have him there. Public ownership will purify politics.

THE PEOPLE'S PROPERTY

4.—The highways belong to the people. The people, through their representatives, ought to have absolute control of the streets. No private party should be given any right to break up, or obstruct, or in any way control the roadways. Public property ought not to be turned over to any exploiter. The great profit to be derived from any special use of it ought to go to the people, for no railway company will ever pay for the right to use our streets one-half of what that right is worth.

5.—This question has a moral aspect. Apart altogether from the economic issue of the profitableness or unprofitableness of public ownership, there is an important development of public intelligence and of social cohesiveness in the co-operative control of a common service for the common welfare. The selfishness and avarice of private corporations are disintegrating forces. Society needs, our citizens need, the consolidating influence of conditions that will impel men to increased interest in each other and to more united effort for the benefit of all. Even in the details of public employment there is an educating and elevating sense of social usefulness among the men who serve the city and the State. This is one of the reasons for the popularity of public service. When men are working for the community, they are practically working for themselves. The tendency is to evolve in them more self-respect than when they are merely working for pittance wages and the benefit of some greedy monopolist. When the toiler toils for the general good, a new dignity is added to his labor, and a substantial advance has been made in the development of a higher type of manhood, a better citizenship and truer Christianity.

GARBAGE DISPOSAL IN TOLEDO, OHIO

THE recent convention of the League of American Municipalities, in Toledo, afforded an opportunity, to a limited number of delegates and visitors, to go over the plant now dealing with a considerable part of the garbage of that city. The well designed works erected for that purpose are the result of negotiations entered into between the Toledo Reduction and Fertilizer Company and the city authorities, the former undertaking the obligation of treating the material delivered by the latter at the works.

The works are laid out on the unit plan, admitting of gradual extension as the volume of garbage increases; each unit is capable of handling twenty tons of mixed city refuse per day and the present outfit embraces three units. A commendable feature of the adopted method is the freedom from handling, the successive stages of the process being almost automatic. The garbage is delivered onto elevated floors from which it passes into sealed digesters, two to each unit; it is subjected, in these, to the action of steam for about eight hours and subsequently dried by retention in rotary driers for a further period of ten to eleven hours. The fact that these processes are carried on in steam-tight vessels accounts for the almost entire absence of objectionable odor in and about the works—a feature favorably commented upon by those who made it an object to include the plant in their round of visits.

Although the material, on leaving the driers, is a harmless and inoffensive mass, it still contains a proportion of grease sufficient to justify further treatment for its removal and sale. The affinity of naphtha for fatty matters is made use of in this connection, and the resulting semi-fluid substance is shipped by rail, in air-tight cylindrical tanks, to soap works and other industrial concerns.

The remaining products are carried forward to a separate factory, in which they are used as a base for a wide range of fertilizers, being fortified by the addition of lime-phosphate and other substances. Here, again, there was an absence of those unpleasant odors to which most of the visitors had looked forward with more apprehension than delight.

Ground was broken for the buildings in June, 1904, and the active operation of the plant on garbage was started just a year later. The shortness of the period of actual working precludes discussion of the financial side at this time, but data courteously furnished by the management show that the first cost approximates $25,000 per unit, and about 50-hp are required to operate that sub-division. Each digester holds from five to six tons of refuse and, roughly speaking, a ton of garbage is produced by every 2,000 persons.

The patented machinery used in this plant was designed by Mr. E. R. Edson, of the Edson Reduction Machinery Co., Cleveland, O. All installations for the states of Ohio, Indiana and Michigan are controlled by the Toledo Development Co., Toledo, O. The balance of territory for the United States is controlled by the National By-products Co., Cleveland, O.

THE STREET RAILWAYS OF CHICAGO*

An Opportune Statement by Mayor Dunne—His Scheme for Securing Early Municipalization

MUNICIPAL ownership and operation of public utilities has been in force not only in European countries but throughout the United States for half a century, if not longer. It has proved, with reference to the utilities so owned and operated, efficient, economical and entirely satisfactory to the public. During that half century it has been applied mainly to the production and distribution of water, the establishment and maintenance of municipal sewerage systems, parks and, in many instances, municipal bathing houses. Within the last ten years a tendency has manifested itself throughout the whole civilized world to extend the ownership and operation of public utilities to gas plants, electric light plants, telephone systems and street car traffic.

It has been extended very rapidly in a great many cities within the United States to the operation of gas and electric light plants, but its extension towards the ownership and operation of street car systems in the United States has been stubbornly resisted by private interests strongly intrenched in their position by charters given to private companies in years gone by. The opposition towards the extension of the principle to street car traffic has also been stubbornly resisted in Europe by the same interests, but gradually, during the last ten years, this opposition has been overcome by the people steadfastly insisting upon their right to own and operate their own street-car systems.

At the present time in Great Britain and Ireland, one hundred and forty-two municipalities own their own street car lines, with an aggregate capital invested of much more than that invested in all the privately owned street car companies in that empire. They are operating more mileage than all the combined private street car companies in the kingdom. Municipal ownership of street cars has extended throughout many of the great cities of Europe outside of the British Empire. It prevails in Berlin, where, as is shown by the public press within the last week, the municipality has devoted $100,000,000 for further equipment of the municipal system. It prevails in Vienna, Budapest, Milan, and in many of the great cities of Australia.

Practically all this development of municipal ownership of street car systems has taken place within the last ten years. This gigantic development of municipal ownership in the matter of street cars could not have progressed unless it was found that it was practical, economical and satisfactory to the people. Investigation shows that in the great majority of the municipally owned plants in Great Britain, municipal ownership has benefitted not only the general body of ratepayers but also the tramway employees. In London, where municipalization is rapidly extending, it has brought about: first, relief of rates from the profits of the undertaking; second, the institution of all-night car service; third, the running of workmen's cars at reduced rates; fourth, reduced fares for ordinary passengers on many of the principal routes; fifth, removal of advertisement signs from street cars; sixth, institution of a ten-hour day for all tramway employees; seventh, recognition of the principle, one day's rest in seven; eighth, increased wages for all employees; ninth, free uniforms for drivers and conductors.

The same results have been achieved in most of the cities in Great Britain where the municipality has taken over the street car systems. In the cities of the British Empire the average fare paid is less than 2½ cents per ride. In an article published in the June number of the MUNICIPAL JOURNAL,* it appears that the return on capital in municipal companies amounted on the average to 7.34 per cent., while the return on capital invested in private companies was 4.75 per cent. The net results, without a doubt, are that municipal ownership of street car systems, wherever it has been placed in force, has resulted in economy of cost to the people, in efficient service, in satisfaction among tramway employees and the public in general. It has reduced street car fares, given better service, more frequent and better equipped cars, increased wages to traction employees, reduction of their hours, abolished strikes and the apprehension of strikes, and last and above all, it has removed graft and corruption in so far as it appertains to street car management and the procurement of franchises from the body politic.

Such has been the result of the municipalization of street car systems in Europe and Australia and such has been the result with reference to the ownership and operation of gas works, electric light plants, water works, sewerage systems and other public utilities where owned and managed by the public both in this country and abroad. The knowledge of these facts, obtained from reading, from observation, and in many cases by actual experience by the citizens of Chicago, has induced them to advocate and vote for the municipalization of their street car plants.

Chicago has owned and operated its water-works for nearly half a century, and as the result the city is to-day furnishing its citizens very cheap water, and not a corporal's guard of Chicago's citizens would vote to place the operation of that utility in private hands. It is selling water to its citizens for less than one-half of what private companies are charging for the same utility in neighboring cities. For the last eight years Chicago has owned and operated its own municipal electric light plant, and although it has not been empowered in the past to sell electric light to private citizens,

* Part of an address delivered by Mayor Dunne, of Chicago, before the League of American Municipalities Convention, held at Toledo, Ohio, August 23-25.

* Page 284, in Talk by Mr. L. B. Hall, Grand Rapids, Mich.

it has, in the manufacture of that light for the illumination of its streets, succeeded in the last eight years in cutting down the cost of that utility to one-half of what was charged for it by private companies.

Chicago has had experience with public ownership of public utilities and with private ownership of public utilities. Its public ownership of its own utilities, electric light and water, has resulted in efficient, economical service and the public are content. Its experience with the operation of another public utility in private hands, to wit, its street car system, has resulted in giving to the citizens of Chicago the worst street car service in the United States at the same cost to the public that an efficiently managed street car system could be conducted. Its citizens have discovered that private street car companies now operating in its streets have capitalized their plants with stocks and bonds at four times the value of the tangible property owned by these companies, and that the citizens of Chicago have been compelled for years past to submit to service which was deliberately designed to be of such a character as to pay interest upon this enormous capitalization—a service which has been so execrable and scandalous that the citizens have arisen *en masse* in protest against the continuance of the same.

It has been a system which has crowded human beings like canned herrings in filthy cars, propelled over roadbeds so uneven and defective as at times to cause seasickness among its passengers. It has been a system which has compelled the citizens of Chicago by thousands to stand on their passage to and fro from their homes during the rush hours. At times they have been compelled, in order to secure passage, to clamber upon the roofs of these cars and to hang upon their footboards and draw-bars at great risk of life and limb.

With such accommodation given to the public its citizens have witnessed repeated efforts, many of them successful, to debauch and corrupt its city council and State Legislature by the wholesale use of boodle and bribe money. They have been compelled to hold indignation meetings and to invade the Legislature and the city council, in the guise of mobs, to compel their representatives to refrain from the passage of laws and ordinances which would extend the franchises of these companies for half a century. So great have been their grievances and so righteous their indignation that they have on three separate occasions at the polls declared their intention of refusing all further extension of franchises to the private companies and of taking over the street car systems and placing them in the hands of the municipality.

First, in April, 1902, a vote was had under the public policy act of the state, and on that occasion 142,000 of the citizens voted in favor of public ownership as compared with 27,000 against. In April, 1904, the question was presented in the shape of a public vote in favor of the adoption of the Mueller Bill, which bill authorized the citizens of the State to own their own street car systems. The vote was 153,000 in favor as compared with 33,000 against the proposition. Again, in April of the present year, the people expressed their opinion on the subject in the shape of a vote upon the question of the adoption of the so-called tentative ordinance, which provided for an extension of the franchises of the present companies. The vote in favor was 64,000 as compared with 150,000 against.

Both of the candidates for mayor in March, 1905, repudiated the so-called tentative ordinance, but one of them, while announcing himself in favor of ultimate municipal ownership, refused to pledge himself against any extension of any character, while the other pledged himself against the granting of any extension of franchises to the present companies and for immediate steps to bring about municipal ownership, and he was elected by a majority of approximately 25,000 votes. This result was obtained in spite of the fact that all of the papers of the city of Chicago, except the Hearst papers and the "Chicago Journal," earnestly and strenuously supported the candidate who would not pledge himself against the extension of franchises. And yet, in spite of this emphatic declaration of the people's will, thrice expressed at the polls, the moneyed interests behind the present traction companies are to-day, through the banks and through every possible agency that they control, determinedly and persistently attempting to defeat the popular will by throwing every obstacle possible in the way of the municipalization of these plants.

They have appealed to the federal courts for an injunction. They are vilifying public officials who were elected to carry out the people's will. They are misrepresenting their motives, questioning their integrity and resorting to every underhanded and unfair method that they can conceive to prevent the citizens of Chicago from owning and operating their own street car systems as has been done by hundreds of the greatest cities of the civilized world. Relying upon the fact that the tenure of office of the Mayor of Chicago lasts only for two years, they are endeavoring, in every possible way, to procure delay and hinder and hamper the people and their duly elected officials in carrying out the people's mandate. Such is the situation in the city of Chicago to-day. With three out of four of the citizens of Chicago on record in favor of municipal ownership, the traction interests say it shall not be done.

In continuing his address, Mayor Dunne recapitulated at length the past history and present status of the Chicago street railway problem. Contrary to an opinion which has gained considerable ground as the result of recent proceedings, he showed that the situation which has now arisen was among the contingencies contemplated by him during his candidacy for the mayoralty, which, as is well known, turned upon the street railway contention. The scheme devised by him to meet existing conditions and to facilitate that more rapid progress which the citizens so urgently desire, is "a plan under which a private company, acting for the real benefit of the city of Chicago, can proceed to build or acquire a street car system without being hampered by these delays and turn it over to the city upon the payment by the city of Chicago of the cost thereof, with interest on the cash invested, so that the citizens of Chicago can, at the earliest possible moment, attain the object for which they have voted so continuously and overwhelmingly." Mayor Dunne's address distinguishes this as the "contract plan," what is known as the "city plan" being action under the provisions of the Mueller law, the operation of which is, he claims, being wilfully impeded. A message which he sub-

mitted to the city council on July 5 embraced both these plans, the former being outlined in the message as follows:

"Pursuant to the 'contract plan,' the city council would build, acquire and operate street railroads through the instrumentality (for financing, acquiring, constructing and operating) of a private company composed of five men who command the confidence of the people of Chicago for their personal integrity, their business ability and their profound sympathy with the policy of municipal ownership of street car service, such corporation to be bound by contracts insuring the performance of their undertaking wholly in the public interest."

The essence of this scheme, as set forth under seven heads in the message, is the fact that it is to be operated by a company for the benefit of the city, whose control is to be of the most far-reaching character. Its advantages are thus summarized in the message: "The superiority of this plan over the city plan herewith attached for comparison is manifest. It requires the passage of only one ordinance by the city council; it provides for supervision and control by the city council from beginning to end; it precludes excessive profits by making the company and its directors trustees of all profits over five per cent. for the city, and it obviates the necessity for delay in rehabilitation while referendums are taken and the validity of the street railway certificates is tested in the courts. Yet, while establishing virtual immediate municipal ownership and operation, it secures the right of the city to actual municipal ownership and operation as soon as the validity of the certificates shall have been tested and the people shall, by the referendum required by the Mueller law, have decided to act. By means of this plan the municipal street car system can be put into condition for first-class service, on the lowest level of cost, during the time when the various legal preliminaries to actual acquisition and operation by the city are being perfected, and yet without prejudice to that acquisition immediately upon the completion of these preliminaries."

The concluding paragraphs of Mayor Dunne's address are given below.

The disposition of the Mayor of Chicago and the people of Chicago is to treat the present companies fairly and even liberally. I am of the opinion that their properties should be purchased at a full, fair price, aye, even a liberal price. But that seems by the past conduct of the companies to be highly improbable, if not impossible. I believe it is the duty of the citizens of Chicago, in view of the fact that new power plants must be constructed even if the present old ones were acquired, to proceed with the work of building a municipal system upon the streets now incontestably at our disposal. The 270 miles of trackage which are now or will be at our disposal within the next two years, more than one-half of which is now at our disposal, runs through the most densely populated portions of the city and into the very heart of the business district, so that a municipal line constructed on these streets will be absolutely remunerative from the very start. Indeed, I am assured by men well-informed by actual operation of street car plants that the revenues from the plants so constructed will pay for this contemplated system inside of ten years without obtaining a dollar from any outside source.

This plan of constructing a system for the city, or acquiring for the city a municipal street car plant, is now pending before the local transportation committee of the city council. I shall urge in every possible way the passage of ordinances in conformity with this plan, which has the approval of the best and truest friends of municipal ownership in the city of Chicago. But it has at the same time the intense disapproval of the present traction companies, who have rushed into the Federal courts to obtain an injunction to prevent the city of Chicago from carrying out the same. It has the disapproval of every stockholder and bond-holder of the present companies, of every newspaper, bank and syndicate that is controlled by or is affiliated with them. Its advocates have been subjected to all sorts of misrepresentation and vilification for attempting, in response to the demands of the people, to bring about municipal ownership at the earliest possible moment.

We shall continue to receive such vilification and abuse. I have been represented throughout the United States as having abandoned my municipal ownership views, as having proved recreant to my preëlection pledges and disloyal to the people of Chicago. Vilification has taken the place of argument, and mendacity has supplanted truth. But neither vilification nor mendacity can swerve either myself or the friends of municipal ownership from the course that we are pursuing. If any better scheme can be devised which will produce more immediate results, we will adopt it. We shall pursue our even course to satisfy the people's will and to accomplish the people's demands. We shall neither be intimidated nor cajoled, bullied nor badgered into departing from a program which we know the people demand and which we insist the people shall obtain.

Municipal ownership of public utilities is no idle dream, but a practical reality. The demand of the people for the same is growing apace throughout the country. It has resulted in the past in securing economy and efficiency of service to the people, and in abolishing strikes and corruption wherever it has been tried, and what it has accomplished in other cities it will accomplish in Chicago and the other cities in the United States.

THE SMOKE NUISANCE*

Causes and Remedies Considered by an Expert in This Department of Civic Work

PAPERS on the suppression of smoke usually deal with the mechanical devices which, to a greater or less extent, prevent the emission of smoke from the chimneys of steam generating plants. The writer will, in this paper, touch upon some of the municipal methods of abating the nuisance, particularly in those cities located in the middle West.

Black smoke or soot is, of course, unconsumed carbon, which may be present in greater or less quantities, usually, however, far less than is commonly supposed. The cause of this objectionable smoke may be summed up in a single sentence, as it is due to one or both of two causes. Unskilled manipulation of the fires, or a furnace not suited to the coal, are the smoke-making conditions.

While the actual loss by unconsumed carbon may be small, the mere presence of smoke indicates other losses which may be great. These losses are:

1. Carbon monoxide.
2. Unconsumed hydrogen.
3. Excess air.
4. Insulation of tubes by soot.

The losses from these causes may be as high as 50 per cent., and will bear no relation to the actual loss from unconsumed carbon. The remedy for these conditions is in the hands of every competent engineer and the cure is effected by the use of various well tried devices.

The actual loss in fuel economy falls where it should—on the shoulders of the man that produces the smoke; but there are other losses, imposed on the public, that cannot be so lightly passed over. There are enormous losses from depreciation of property, injury to the general health, the increased cost of painting buildings, and the injury to delicate merchandise, not to speak of the extra washing and scrubbing necessary to remove soot and grime.

The smoke nuisance is a condition at present intimately connected with the soft coal district, but as the supply of anthracite coal is limited, the problem will, in a comparatively short time, be general. A coal map of the United States shows deposits of bituminous coal and lignites in nearly every State in the Union, indicating that for centuries to come the fuel of the American people is to be smoky coal. The only sections of this country that are at present in any way exempt from the smoke nuisance are those cities situated at or near the anthracite or Pocahontas coal regions, the oil fields, or the natural gas deposits.

Many cities in the soft coal district import so-called smokeless coal, for use under certain conditions. Some apartment houses and public buildings have found that this coal is so much cleaner to handle that it is cheaper for them to burn it than to try to use soft coal at a lower price. This condition arises from the fact that conditions of firing vary radically for the two coals, and unless a plant is especially constructed for soft coal its use will meet with serious difficulties.

The objection usually advanced against the use of soft coal is the investment required to properly burn it. Some very small plants, using less than 1,000 lbs. of coal per day, require an investment of from $200 to $500, while for the largest plants the cost may run up into the tens of thousands of dollars.

Owners have a deep-seated prejudice against smoke-preventing appliances and especially against the more expensive ones, the business being looked upon as a fake and compliance with the smoke ordinance a hardship to be complied with at the least possible expense. Hence the popularity of the steam jet and some other devices that need not be mentioned. The smoke prevention department of every city encounters this prejudice, which must be overcome before any amount of real work can be done.

As already mentioned, the location of a city has much to do with the smoke problem. For instance, Cincinnati, situated with smokeless coal deposits to the south and east and bituminous coal to the north and west, is far easier to handle than Chicago, Indianapolis or St. Louis, all of which lie on the outskirts of the smokiest coal deposits of the United States. The cities adjacent to the coal beds of Ohio and Pennsylvania are better off than those near the Illinois coal beds, as these eastern coals are less difficult to handle and the distance from the anthracite regions is not so great as to make the use of this fuel prohibitive.

The use of the smaller sizes of anthracite in the bituminous coal regions has been largely increased by the use of the suction gas producer and the gas engine. For those localities where pea anthracite is less than five dollars and bituminous coal more than one dollar per ton the gas engine can compete with the steam engine. Coke and charcoal can also be used, but the suction gas producer is not yet in condition to use bituminous coal. When that time arrives, we may look to see the steam engine supplanted by the gas engine for many classes of service.

The serious problem of preventing smoke from residences can only be handled through the use of smokeless coal or the central heating plant. This latter makes a happy solution of the problem for the city smoke department, as there is less difficulty handling one large plant, operating under a franchise, whose chief expense is coal, than when handling

* Paper (condensed) communicated to the League of American Municipalities Convention, held at Toledo, Ohio, August 23-25, by Mr. R. P. King, C. E., Smoke Inspector, Indianapolis, Ind.

several hundred small consumers. Lighting companies are beginning to realize what a vast revenue the exhaust steam from their plants becomes when used for heating; and the electrification of our railways will bring immense power houses to the large cities; this vast amount of waste heat can be used to solve the problem of smoke from private residences.

When framing a smoke ordinance we must assume that it has some good basis for its being; for in order to successfully withstand contested cases it must be authorized by some sound legislative enactment, otherwise it would fail. Starting at this point, the framing of the ordinance has much to do with the success of its future enforcement. The ordinance should:

1. Declare smoke a nuisance.
2. Fix the responsibility for violation.
3. Fix the authority and duties of those having charge of its enforcement.
4. Contain an alteration clause.
5. Provide a permit clause and fix fees.
6. Provide a penalty.

In fixing the responsibility the burden should be divided. The burden of originally making the plant a non-smoker should be on the owner: that of keeping the apparatus in repair should be on the employee.

The authority of the smoke department should be definitely fixed, but its duties should be outlined in a general way only.

It seems to the writer that the alteration clause is the best way of primarily attacking the problem. In this case a certain time is given, during which time the plants are supposed to be changed. With a permit clause in effect, this will give the chief of the corps an opportunity to watch conditions and collect data before prosecutions are in order.

In fixing the fees, $5 for new installations and $2 for repairs seems to be the usual charge for each boiler.

The Chicago ordinance places the alteration limit at one year, which time of course had to elapse before any advance was made. This ordinance is included in a steam boiler ordinance and the enforcement of both is in one department, which seems a very happy combination. This ordinance is particularly strong on fees, dividing them with great precision. The Milwaukee ordinance contains no alteration clause, making the owner liable immediately upon the passage of the ordinance. It also lays down with considerable minuteness the duties and qualifications of the smoke inspector. The amended Cleveland ordinance is modeled after the Indianapolis ordinance, with the exception of omitting the duties of the inspector and changing the name to supervising engineer. Instead of providing an alteration clause, the Indianapolis ordinance makes it the duty of the smoke inspector to inspect each plant, point out the cause of the smoke, make recommendations and set a time for changes, the limits of which are laid down by the ordinance. There are very few smoke ordinances that have not been amended since their passage, which shows that the best laid schemes sometimes fail to carry out.

The personnel of the department is of great importance, as the suppression of smoke is in reality an engineering work of no small magnitude. The work of collecting data, ordering changes, supervising new work, and instructions requires a man of technical executive training. He should be competent to conduct tests, to make analyses, be of wide practical experience, diplomatic to a degree, and of unimpeachable integrity. His title should be that of engineer and his position must be one of dignity. Such a man can command an ample salary, and a corresponding one should be attached to his municipal position. Under him should be a practical fireman, familiar with the care and operation of the various smoke preventing devices in use. The work of making charts, photographs, prosecutions, etc., may be acceptably done by any one having received a certain amount of instruction.

The department should be located in commodious quarters and equipped with all necessary apparatus. This will include draft gauges, pyrometers, indicators and analytical apparatus. For measuring draft the U tube is commonly used and is sufficient for any but the more refined work. For measuring the furnace draft a Barrus gauge is acceptable, although the furnace draft may be tested by means of a candle flame, while an open handkerchief makes a reasonably accurate gauge for testing the ash-pit draft. Thermometers may be used for temperatures to 1000° F., and may be carried by inspectors at all times. For continued measurements an electric pyrometer is used which is reasonably portable and may be used to 3000° F. The Orsat apparatus is generally used to make flue gas analysis, and as it is reasonably portable may be carried from place to place as necessary. For coal and water analysis other apparatus of a purely chemical nature is required.

The writer has never found any reliable data concerning the steam plants visited and inspected. Many employees do not know the sizes of the boilers under their charge; coal consumption is a thing to be guessed at, monthly coal bills being the best information obtainable. I know of but one plant in Indianapolis that keeps a daily record of coal burned and not a single instance of a reliable and complete log being kept.

I have spent much time in compiling data and conducting tests with the sole idea of providing for the steam users of Indianapolis reliable data upon which to base future calculations. The following table is partly the result of these tests.

Proportions

When designing or altering furnaces the following general rules should be observed:

Minimum height of chimney 75 feet (this height only when chimney sets on smoke box; allow extra height to compensate for losses in horizontal flues and right-angle bends).

Allow 5 lbs. coal per rated horse-power.

Estimate the grate area on a consumption of not less than 20 lbs. coal per hour per square foot. This gives, for a 100-h.p. boiler, 25 sq. ft. of grate area. If possible, increase the draft to reduce this area to 20 ft.

Vary the grate area for boilers in the same battery, increasing this area as the distance from the chimney increases.

The following ratios are approximate, but are in accordance with the above rules:

Grate area to heating surface, from 1:45 to 1:60.
Grate area to area over bridge wall, 5:1.
Grate area to area across tubes, 6:1.
Grate area to area across breeching, 6:1.
Grate area to chimney area, 7:1.

I found the best results with bituminous coal to be when running with a high rate of combustion. A hot fire can only be produced by a high rate of combustion and a hot fire is the only smoke-preventing condition. Our department recommends a rate of not less than 20 lbs. per sq. ft., while 30 lbs. is excellent; get 40 lbs. if you have the draft. Under these conditions smoke prevention is possible and economy is assured.

The collected data of the department should be given at times to the steam users, through the medium of bulletins. Several smoke departments are using this means of education. The bulletins should be short, not too technical and to the point. The newspapers may be of great assistance in a smoke campaign, but this help is sometimes of a doubtful character.

After discussing some considerations affecting the application of smoke-preventing devices the paper proceeds to review in detail the four classes into which these may be divided. The author groups these as follows:

1. Steam jets.
2. Furnaces.
3. Mechanical stokers.
4. Smokeless coal.

The following paragraphs of general interest are found in the closing portion of the paper:

The economy of smoke prevention is a well demonstrated fact. For instance, a smokeless furnace reduced a certain coal bill 65 per cent., bringing the cost of 1,000 lbs. of steam to 10½ cents. This with coal delivered by wagon to a very small plant. Another firm, with stoker equipment and track in the boiler room, gets 1,000 lbs. of steam for less than 9 cents. A large power plant fully equipped with stokers gets the cost of power down to less than ½ cent per kw. hour.

The Cleveland department of smoke abatement has issued a pamphlet on boiler economy to the steam users of that city. There the campaign is one of education solely, and the results that have been attained are due entirely to a desire to save money. In Chicago the campaign has been one of prosecution, although the amended Chicago ordinance is more one of education than formerly. Chicago and Cleveland are the two most notable examples of clean cities in the soft coal districts. With opposite methods, it may be mentioned that Cleveland has made the best showing.

MUNICIPAL FINANCE AND ACCOUNTING*

The Principles Governing Any System for Public as Opposed to Private Corporations

Municipal finance and accounting is a topic on which, in late years, a great deal has been said and written. In the United States the subject has taken the title of "Uniform Municipal Accounting," a designation, in my judgment, involving a misnomer, as no uniform system of municipal accounting can exist until we have uniform municipal charters.

A vast improvement can be brought about in the management of municipal finances, and in the publication of comptroller's reports, by proper agitation. I feel called on here to candidly admit that my knowledge of the affairs of Canadian municipalities is very limited, and that whatever I do know about the subject I have learned as a municipal officer in the United States.

We often hear it proclaimed that, as a municipality is a corporation, its financial management should be the same as that of any private corporation. This is an essentially wrong view of the situation. Municipal corporations should be managed on an entirely different plan. A private corporation is organized and managed to make money for its stockholders. All its energies are bent in that direction. A municipal corporation, on the other hand, is of a paternal nature, the funds disbursed being solely for the welfare of its members. The paramount duty, then, of every municipal officer is to see to it that every dollar expended, whether raised by bond issue or by tax levy, brings an adequate return in the shape of some measure of benefit to the public at large.

Municipal finance or, I might say, the financial policy of a city, involves an essentially different and more comprehensive question than that of merely keeping its accounts. It is a question of how to raise the necessary funds in the most equitable and least burdensome manner for the maintenance of the corporation. In most of the large cities of the world this has become a serious question. As statistics show, the cost of municipal government in most of these cities has increased over thirty per cent. in the last twenty-five years. Of course the conveniences and benefits derived by the citizens of a large municipality are vastly greater than they were years ago. Taxes are accordingly, and of necessity, higher in all large cities. We want the streets graded, paved and kept clean; the city well lighted and in possession of an adequate and well-maintained sewer system. We must have free public schools, play grounds and public baths, as well as an extensive park system. There is, be-

* Paper read before the Union of Canadian Municipalities Convention, held at Winnipeg, July 25-27, 1905, by Mr. Louis Betz, City Comptroller, St. Paul, Minn.

sides all this, a constant demand for new conveniences and improvements to be furnished by the municipality.

How to supply all these, essentials and non-essentials alike, and to keep down the tax rate at the same time, is at present the problem of all large cities. If direct taxation becomes too burdensome, then the city must create other sources of revenue. It should have a just and thorough system of licenses, including a vehicle tax. It is the wagons, and especially the narrow-tired ones, that grind up our pavements, but do not pay for them. The city should own all public utilities or, at least, control all municipal service corporations so as to get a good share of their earnings. In fact, the city should own everything on top of and under its streets, from lot line to lot line.

Only in this way can the tax rate be kept down to a reasonable point.

As to bond issues, there seems to be quite a difference of opinion as to what constitutes a proper occasion for them, and as to the extent to which a city is justified in issuing bonds in proportion to its assessed valuation. In my opinion bonds should be issued for the following purposes only: (1) For remunerative municipal enterprises that are self-sustaining; (2) the acquiring of real estate; (3) the construction of municipal buildings; (4) the construction of main sewers; (5) the construction of bridges. Every dollar, in my judgment, raised by a bond issue and expended should be represented by a tangible asset. A city which seeks to be in the swim of municipal progress should be liberal in making permanent improvements and in issuing bonds to pay for them. Such improvements should be constructed in the very best manner known, so that they may last for generations. If the proper sinking fund is created for such bond issues they will not become a burden on posterity. I believe that your observation has shown you, as mine has certainly shown me, that the cities having the greatest per capita bonded indebtedness are the most progressive in the world.

It is, accordingly, hard to determine at what per-centage of the assessed valuation the limit of bonded indebtedness should be placed. In many cities of the United States it is five per cent., and, in some cities as much as ten per cent. I think the latter figure a very safe limit. It is not necessary to comment on the rate of interest or periods of maturity of bond issues; these things are determined by existing conditions. But I do believe that, in all cases, any premium realized on bond sales should be placed to the sinking fund. If it could be made possible, I would place all bonds and certificates with the citizens of the municipality issuing the same. Tax payers would then be paying interest to themselves, and in such a case the size of the bonded debt would make little difference as regards the stability of a given city. As the case is now, at least in the West, large sums of interest money are being sent to eastern money centers, and all moneys so paid are a distinct loss to such municipalities. More important still is the fact that every person owning obligations of the city in which he lives becomes a better citizen and takes a livelier interest in public affairs.

In speaking of municipal accounting I will not enter into details, nor attempt to recommend any special forms or schedules. On this score we also hear it said that business methods should be applied to public accounting. This may be correct so far as the punctuality and discipline of officers and employees is concerned, but, beyond that, we must have public methods in public office. A private concern is responsible to none but its officers for the manner in which its books are kept. The accounts of a city, on the other hand, must always bear the sunlight of public scrutiny. Entries of all kinds must be fully explained, so that in after years their meaning can be easily discerned. Above all, a public accounting system must be as simple as possible, and at the same time have the proper safeguards thrown about it to minimize the chance of defalcation. The more complicated the system the easier it gets out of order, and the easier is it for graft to appear.

The management of a city's finance and accounts should be centralized in one office—the city comptroller's. The power of taxation should be vested only in the general city government, so that no board or department of a city government can have separate funds and separate disbursing officers. In this way every voucher, of whatever nature, passes through the comptroller's office and must be signed by him, thereby making it possible at the end of the year to issue a clear and concise statement of the entire affairs of the municipality. The manner in which accounts are kept must of course be adjusted by and comply with existing laws and the character of the city. But the ultimate result of all accounting must be an annual published statement of the financial affairs of the municipality. Uniformity in such published statements is possible if the cities will take up the matter seriously. The various Municipal Leagues of America have accomplished much in this direction, and the public and chartered accountants have contributed much valuable information on this subject. In several of the cities of the United States such accountants have recently installed new systems of accounting, with elaborate schedules which will, in many cases, appeal only to the expert bookkeeper. The test of time must be applied to these to find out whether they are practical. To my mind, the financial report of a city must be issued for the benefit of the average citizen and taxpayer; it should be drawn up in such form that he will understand it.

There is one day in the year when every taxpayer gets red in the face and swears at the local government. That is the day on which he pays his taxes, and there are probably two questions in his mind on that day: "Why are my taxes so high?" and "What becomes of the money?" These questions should be answered in a plain and simple way in the annual report.

I recently received a copy of the annual report of the comptroller of New York, a volume as thick as Webster's dictionary. How many taxpayers of New York will read that report? I venture to say not a baker's dozen. If the books are so kept and the documents filed in such manner that you can point to any item, or find any voucher or document, it is hardly necessary to cite every minor transaction of the office. What the people want to know is, how much money has been collected and from what source and how and for what purpose it has been expended; how much has each department expended, and what is there to show for such expenditures.

The report should begin with a general statement of the city's fiscal transactions, and should taper off with a detailed statement referring to the several departments. The expenditures should be divided into three general heads, as follows:

1. Ordinary expenditures, being money expended for the maintenance of the government only.

2. Extraordinary expenditures, being money expended for permanent and semi-permanent improvements.

3. Expenditures for public debt, the payment of interest and bonds.

In making up the statement of the city's obligations, the entire interest-bearing debt, no matter what its nature, must be brought under one head, so that one may see at a glance the total liabilities of the corporation. This can be followed by any number of schedules showing the various issues of bonds.

It is the grand totals of all departments that people are interested in, and these must be brought out strongly in the annual report. No city of any consequence should be without the double-entry system of bookkeeping. Every officer or department of the government handling money should make daily reports to the comptroller and treasurer. All departments should make monthly reports to the comptroller, so that their accounts can be reconciled. And of the greatest importance is the daily balance sheet, made out by the comptroller and verified by the treasurer, showing the exact standing of each account on the ledger.

It is the established custom in St. Paul to make out such daily balance sheet, and I have samples of such sheets with me for those who wish to inspect them.

Every city of any consequence should have a statistician placed in the comptroller's office, whose duty it would be to keep a strict inventory of all real and personal property belonging to the municipality, and to keep all statistical work in such manner that at the end of the fiscal year it will take but a very short time to compile and issue the annual report.

I may say, in conclusion, that the one thing above all others which seems to me indispensable before much progress can be made on enduring and universal lines in this matter of municipal finance and accounting, is that all employees of the municipality, at least in the accounting departments, shall be placed under civil service rules. It will then be possible to get good and capable men to enter the public service, knowing that they will not be dismissed with every change in the heads of departments. Young men could then enter upon an official career with some kind of a future before them.

When the civil service system becomes general in the accounting departments of all municipalities in America, and not until then, we shall be able to make a great improvement in municipal finance and accounting.

BUILDINGS*

Their Relation to Municipal Improvements

DEVISE the most elaborate street plan you can and let there be parks and boulevards galore; pave those streets as expensively as you wish, install the finest water system known to engineering science and let the sewerage, the lighting and all the "municipal improvements" be superlatively fine, yet without buildings what will your "city" be? Indeed, are not all those improvements but mere accessories, adjuncts, conveniences to the buildings? And according to the character, the importance, the utility and beauty of those buildings, above all else, will your city be judged and assigned its place in the measure of municipalities. Therefore, it is but just and meet that this convention of the American Society of Municipal Improvements devote some time to the consideration of that greatest of all municipal improvements.

The paper next deals with the improvement to be noticed, in recent years, in the attitude of cities and towns and public associations in regard to the importance of the proper location and regulation of buildings. In particular, credit is given the modern method of securing competitive designs for public buildings, as compared with the selection of architects through political influence, with a corresponding change in the character of the structures. It proceeds:

In the matter of construction there has also been some improvement. It is not so long ago that every individual felt that he had a perfect right to build as he wished, however perniciously his mode of building might affect his neighbor's property and the general welfare of his city. If he deemed it to his interests to build flimsily, "mere food for flames," he had a perfect legal right to do so. And it was about that time, too, that people laid sidewalks to suit themselves, of the material they wished, of the width they wished and at the grade they particularly desired, so that you went up and down steps along the sidewalks of badly lighted streets, much to the discomfiture of gentlemen who had been attending night sessions of conventions or other such unbalancing functions. When cities began to regulate this matter of sidewalks, dictating of what material they should be, establishing uniform grades, and, indeed, doing the work to suit themselves and charging it up to the abutting property, a howl went up against "interference" with

* Paper (condensed) read before the American Society of Municipal Improvements Convention, held at Montreal, Can., September 5-7, by F. W. Fitzpatrick, Washington, D. C.

private rights; the "liberty of the individual" was said to be assailed, and it took time to make people realize that it was all for their own good. So with building regulations. When building codes first became the "fashion," much popular opposition was made to their passage. It was, indeed, an assailing of private rights, of individual liberty, paternalism running riot, an unwarranted interference with things which did not concern the municipality. Lately, the public seems to have had its eyes opened to the fact that good building is, in the long run, an economy to both city and individual, and it is only the Buddenseiks, the speculative builders, unprincipled rascals who build but for to-day in the hope of selling their whitened sepulchres to some unsuspecting innocent to-morrow, who oppose sane laws and throw obstacles in the way of their enforcement. Yet, unfortunately, these very men are a power, as we must perforce admit, because every wise law that is suggested certainly does meet with very violent though insidious opposition.

While I have the greatest sympathy with and, indeed, work most zealously for the artistic development of our cities, I think we have perhaps overworked that field at the expense of sound construction. Come with me through the residential streets of almost any city and we shall see handsome residences and dainty cottages, very models of artistic daintiness, and so even with the great office buildings and municipal structures. They are pleasing to the eye, their proportions are artistic, the materials of the exteriors are expensive, and even the decoration of the interiors shows refinement and a considerable development of apparently real art. But in nine cases out of ten these handsome fronts and decorative interiors are but a gloss, a veneer to very indifferent, if not inferior, construction, a simulation of stability and permanence and real improvement. Take any municipal or private building, your own home for instance. Supposing your architect has planned a marble exterior, fireproof construction, the best of equipment and rather elaborate interior decoration. The bids come in and are away above the appropriation you have set aside for the building. Nine chances to one the first thing both you and the architect would think about cutting off would be the fireproof, permanent mode of construction, the next thing would be the saving in some of the vitals, possibly the plumbing or something of that kind, and the very last thing to be pared down will be the marble front. I tell you it's our national failing to love a good front and be not too inquiring as to what it covers up. In a building it savors much of the ridiculous, reminding one of an unlettered, unwashed savage got up in the habiliments, the toggery, of a gentleman in the hope of deceiving us. And that very failing, that blindness to the real purpose of building, is what is costing us thousands of lives and millions of dollars every year.

Think of it. We throw away annually in fire losses four times as much as it would cost us to build every blessed thing that is erected throughout the country of uninflammable, imperishable materials! Think, too, of all the municipal improvement, so-called, that is made necessary by this folly of flimsy construction: improved water supplies, magnificent fire departments and what not to protect us at least a little from the danger we have created and are adding to every day.

The question naturally arises at this point: "What is a good building, sound construction?" Let us spend a few minutes on the subject; it is well worth our time and attention. To begin with, the requirements naturally vary according to location. But let us set down as fundamental rules a few salient points. We know that wood burns; we know that granite, all stones, marble, slate, metals, concrete, glass and all plasters into which lime and sand enter are very much damaged, if not destroyed, by fire. And, since fire seems to be the most destructible element to which municipalities are exposed, it would seem meet and reasonable to do everything possible to escape the ever-present danger and forestall the possibility of that danger continuing, *ad infinitum*, to threaten every community, every assemblage of buildings. The first thing to do, rationally, would seem to be to avoid the use of wood anywhere. It isn't a necessary material. There was a time when timber construction was an economy—indeed the only thing available. Those conditions no longer exist, but we have got into the habit, it has become hereditary, and, though wood is actually a luxury, we foolishly go on insisting upon its use. The next thing is, since we know that certain materials are damageable by fire, to avoid thir use (or to protect them if they are used) in places where fire can affect them.

There is a very grave misconception in the public mind as to what *is* a fireproof building. All sorts of things masquerading under that name have been foisted upon the people, and naturally those who have been beguiled, but have lost their property through fire, have became skeptical; to them nothing is fireproof, while to the man not yet initiated everything that is so labelled is blindly accepted as such. If you are to erect a building in the center of a large lot, permanently away from everything else, then is the danger of external attack remote indeed, and you are perfectly justified in using granite or marble or the other damageable materials (but not the inflammable ones) upon its exterior. Or, if your building-to-be is surrounded by nothing but fireproof buildings, then, too, is external exposure minimized and latitude justifiable. But if your building is in a dangerous neighborhood, surrounded by old, ramshackle buildings, wholesale warehouses of flimsy construction and filled with inflammable materials, then are you justified in nothing less than the use of the best fire-resisting materials. If your building is to be occupied by few people, highly intelligent and interested in the structure's welfare, and if there is to be no fire, cooking or dangerous illuminating, then you may indulge in considerable latitude in the interior and fittings, but those conditions are remote. Your greatest danger is generally from within, and therefore should everything be done to minimize that danger to the utmost. Just so much as your exposure increases should your precautions be greater, and, inversely, may you depart from the most stringent requirements as those conditions become more favorable.

No society that has been organized purely for the public weal has as splendid an opportunity or is so well equipped to point out the way to reform and to insist upon the betterment of conditions than the American Society of Municipal Improvements. We should join our forces to the other societies that have organized a campaign of education look-

ing to the betterment of building. Publicity, everlasting hammering through the newspapers particularly, public discussion and such means, easily available to this society, constitute the best ways of securing the desired end. Let us clamor for the strictest building regulations. They work no hardship upon honest men. Let those regulations be so stringent as to virtually bar the possibility of fire damaging the new buildings, and they should surround the old with such safeguards as to lessen their danger to the minimum and make their maintenance so expensive to the individual that, dull of comprehension as he may be, it will soon be evident to him that a good building is more profitable than a poor one. Forbid him to add stories to his old ramshackle, or wings of similar construction. If he is not willing to obliterate the danger that exists with him, at least prevent him from increasing that danger. Let the building regulations be such as to prohibit experimental construction with its resultant collapses and loss of life. Clearly prescribe the right way and as definitely proscribe the wrong way of construction. Insist upon the executive officers, the building inspectors, having due authority to enforce these regulations, then exert your personal and society influence to see that the right men receive the appointments to these offices—men who will understand the regulations and enforce their every requirement without fear or favor or political bias. Give attention to the sanitary equipment of those buildings; do not limit your interest to the taking care of the sewage when it leaves the building, start it properly. Advocate sensible limitations in the height of buildings. A man is justified in increasing his building to its greatest reasonable productibility, but do not permit him to make chasms of your streets. Get together and try to have your cities adopt some uniform code of building regulations; harp upon the necessity of some intelligent and artistic general plan of your cities. It isn't necessary to start in to-morrow making beautiful parks here and there and spending millions in new public buildings, but it is desirable to arrange a plan so that when a park is to be located or a building is to be erected it will merely occupy the place assigned it in that plan and will have some relation to the entity. Let all the efforts that are made, until the final consummation of the plan, be towards its completion. If a park is in question, keep buying the property little by little as it is for sale. And when appropriations are available for municipal buildings, jealously safeguard not only their construction but their artistic excellence, position and conformity to the general scope and scheme of true municipal improvement. It is your duty as citizens and doubly so as members of this society, to devote considerable time and the greatest attention to all that concerns your city. Do not for one moment lose sight of the fact that we tried to establish at the outset of this perhaps too lengthy paper, that buildings constituted the largest part, the most prominent features of the municipality, and, therefore, deserve well of you.

The remainder of Mr. Fitzpatrick's paper is devoted to the incidence of municipal taxation, with especial reference to the alleged excessive share borne by improved property.

MUNICIPAL WATER SUPPLIES*

A Mayor's Review of Requirements and Methods in this Department of Civic Work

Municipal water supplies having claimed the attention of the human family since the dawn of civilization and, as a subject upon which many volumes have been written by able specialists, would seem to afford at this time little opportunity for original thought. Yet, we rarely open a journal devoted to the science of engineering or of municipal life without seeing something new advocated or something old condemned in connection with municipal water supplies. These discussions being always interesting and often valuable, we may well afford to devote a few moments of the time of this Convention to the consideration and discussion of the conclusions reached by those who have made a study of the question in all its phases and have published a record of their views.

Where and by whom the first system of water-works was constructed we may not with certainty know, but we have the Bible for our authority that more than seven hundred years before the Christian era Hezekiah, then reigning as King of Israel, "stopped the upper water course of Gihon, made a pool and a conduit and brought the water straight down to the west side of the city of David." Since the Book of Kings and the Book of Chronicles are silent as to the details of this municipal enterprise, a vast field of conjecture is open as to how Hezekiah financed his scheme, whether he let out the work to the West Jerusalem Construction Company or employed day labor, and whether, when completed, the system was owned by the Mayor and Board of Aldermen of the Holy City or by the Gihon Water Company. These, together with questions touching franchise, rates, meters, purification and pressure, probably cost Hezekiah many sleepless nights, but need not to any great extent disturb the members of this League; however, before dismissing from our further consideration this distinguished promoter and his water plant, it is but fair to recall the statement of the good book in this connection that "Hezekiah prospered in all his works."

While the knowledge is of little practical value to us, it is nevertheless interesting to note that, commencing three

*Paper read before the League of Georgia Municipalities Convention, held at Griffin, Ga., Aug. 16, 1905, by Hon. L. H. Chappell, Mayor of Columbus, Ga.

hundred years before Christ and continuing for six centuries, the Greeks and Romans engaged in vast works of construction in order to bring to their cities ample supplies of pure water, tunnelling mountains and bridging valleys with works of masonry, the ruins of which are, even to this day, objects of wonder and admiration.

It is an historical fact, perhaps equally remarkable, that this era of activity should have been succeeded by a period of a thousand years of total neglect. Commencing with the decline and fall of the Roman Empire, and continuing until the sixteenth century, there was an almost total absence of notable human effort in the field of water-works construction. During this period the magnificent aqueducts built by the unhappy victims of Roman conquests in the zenith of the empire's power were permitted to fall into decay, and the most populous cities in the world, returning to primitive methods, obtained their water supplies from sources and by means which were grossly insanitary and totally inadequate. It was during this period that the human family suffered as rarely before, and never since, from widespread epidemics of plague and pestilence.

Water-works construction revived in the sixteenth century but made no considerable progress until about the year 1800, at which time an impetus was given by the introduction of cast-iron pipes. These came into use as conduits for water supplies and distribution about one hundred years ago. Prior to this time, wooden logs bored through the center were used for distributing mains, and domestic supplies were drawn as needed from fountains and street hydrants.

Following the use of cast-iron pipes came the piping of houses, but for many years the flow into the houses was only at certain hours each day, during which the family was expected to draw and store their daily supply. A constant flow of water through domestic service pipes has been in vogue in London only about thirty years. In the United States, the first city water-works system was constructed at Boston in 1652. The progress in this line during the following hundred and fifty years was very slow, as is shown by the fact that in 1800 there were only sixteen water-works systems in operation in this country, while fifty years later there were eighty-three systems. In 1890 there were about two thousand systems and in 1900 about 3500 cities were provided with water-works plants.

Sources of Supply

These may be considered under two grand divisions, namely: surface waters and underground waters, subdivided as follows:

Surface waters may come from { Lakes. / Rivers. / Small streams impounded.

Underground waters may come from { Springs. / Shallow wells. / Artesian wells.

Every city has access to an ample supply of surface water, either river, creek or lake; many small cities, quite a number in the twenty-five thousand class, and a few having a hundred thousand inhabitants, are so fortunate as to be able to obtain their supply from underground sources, and it may be safely said that no city having an ample and wholesome underground supply within reach would give the preference to surface streams.

In 1896, there were in the United States water systems drawing their supplies from—

Rivers	825
Lakes	221
Small streams (impounded)	213
Combinations	21
Total cities using surface waters	1280
From shallow wells	861
Artesian wells	341
Springs	502
Combinations	118
Total cities using underground water	1822
Combinations of surface and underground	254
Total cities in U. S. having water-works	3356

Of these 3356 cities, 2569 had a population of less than five thousand.

The United States census of 1900 showed 867 cities with a population of 5000 or over, of these—

240 had reached	20,000
37 had reached	100,000
19 had reached	200,000

Owing to the limited quantity obtainable from other sources, nearly all cities having a population of fifty thousand and over obtain their supplies from rivers or lakes, the principal exceptions to this rule being certain cities on the artesian areas of the Atlantic and Gulf coast, in the upper Mississippi valley and on smaller artesian areas which are known to exist in the vicinity of the Dakotas, in many parts of the western plains, among the Rocky Mountains and in California.

A large number of important cities having a population of less than fifty thousand are enabled to obtain an ample supply of exceptionally pure water from underground sources, filtered by Nature and, in cases where artesian wells are used, removed from danger of contamination. A smaller number have from necessity, or from motives of economy, resorted to the use of impounded water from small streams. Water supplies from these streams are apt to vary widely during each year, or at least during each series of years, both in quantity and quality; and it should be borne in mind that the safety and efficiency of a municipal water supply must not be estimated at its best nor at its average, but at its worst—just as a water power is estimated by what it will yield at low-water. These small streams, when conditions are favorable, furnish water which is delightfully soft, clear and acceptable for domestic use, but the conditions are liable to be changed by a sudden rain-storm or an extended drought; by increased consumption as your city grows and by increased danger of pollution as the population on your water-shed becomes more dense.

For these reasons, the small stream as a source of municipal water supply is usually regarded as, and if the city grows, is in fact, a temporary expedient. If such a source is to be adopted by a rapidly growing city it is of the highest

importance that the daily flow shall approximate or exceed one hundred gallons per capita of the prospective population, and that the water-shed be owned by the city.

These conditions will reduce to a minimum the dangers peculiar to small streams, namely: short supply, stagnant reservoirs, and polluted water-sheds.

Artesian Wells

Artesian wells may be defined as those in which water flows or is drawn from a porous stratum like coarse sand underlying an impervious stratum such as marl, and so located that the water contained in the porous stratum exerts an upward pressure upon the impervious stratum, due to the elevated and perhaps distant out-crop of the porous stratum.

One of the most extensive and important artesian well areas in the United States is that which borders the Atlantic Ocean and the Gulf of Mexico, extending from New York to Texas. Along the Atlantic coast it averages about one hundred miles in breadth, but along the Gulf it broadens out, extending up the Mississippi valley as far as the Ohio river. The several strata in which water is found out-crop along the foot-hills of the higher country to the west and north and are supposed to have their lower out-crop in the deep waters of the Gulf or ocean, their connection with the ocean being indicated by fresh water springs in the salt water many miles from shore, and by the effect of the tides upon the pressure of certain wells in the coastal plain.

Among the cities which get their supplies from this source are Charleston, Savannah, Jacksonville, Memphis, Montgomery, Selma and many other cities in the territory referred to.

Shallow Wells

The term shallow wells refers to those wells usually dug or driven not exceeding one hundred feet in depth, the water being derived from local or proximate rainfall percolating through the soil and obtaining thereby a degree of purification by filtration. The number of water-works systems deriving their supply from this source, as shown by the statistics above quoted, is probably a surprise to many of us.

Notable examples of these shallow well systems are to be seen at Plainfield, Mass., having twenty six-inch wells thirty-five to fifty feet deep yielding, by the use of pumps, three million gallons daily. Brookline, Mass., has one hundred and sixty 2½-inch wells from thirty-five to ninety-five feet deep, and in Brooklyn, N. Y., about half of the water supply is obtained from driven wells averaging forty-five feet in depth.

Quantity

The startling variation in the quantity of water used by different cities leads to the conclusion that the natural instinct in some cities is to leave the faucets wide open all the time. This instinct must, for the general welfare, be curbed, the only practical and effective curb being to attach a penalty to waste and to place a detective on duty to watch each tap. The bill for excess is the just penalty, and the meter is the detective that never sleeps and cannot be bribed.

The best authorities upon the subject of quantity, after laborious study and the arrangement of elaborate comparative tables, do not seem to have reached a reliable basis for estimating the quantity which should be provided daily per capita. All calculations seem to be queered when we find glaring discrepancies which exist without apparent cause. By way of illustration, it is difficult to understand why the city of Buffalo should consume 270 gallons daily per capita while New Orleans uses only forty-two gallons, or why Allegheny, Pa., should use 247 gallons while Fall River uses only thirty-five gallons.

The consensus of opinion, however, is that a supply of seventy-five gallons per capita daily is safe and a hundred gallons safer—where meters are used.

It is further estimated that the daily consumption in the average American city may be apportioned as follows:

	Per cent.
For domestic purposes (dwellings)	33
Commercial purposes (stores and factories)	30
Public use (fire dept., sprinkling, etc.)	7
Waste	30

These figures, together with available data on the flow of streams, the catchment of water-sheds and the annual rainfall, are based on statistics which, the average engineer will tell you, constitute a reliable basis for calculation and conclusion; but it will be well in this connection to remember the definition offered by the Scotchman, who, after elaborate calculations, lost his money betting on cotton futures. He remarked that in the course of his varied business career he had encountered three kinds of lies, namely: the plain lie, the damned lie, and statistics.

The source having been selected and the supply brought to the city, the question of distribution claims our attention—the details as to size of mains and location of valves and hydrants can readily be worked out by a competent hydraulic engineer, but it usually devolves upon the city, through its proper officers, to select the system of distribution.

The systems may be generalized as follows:

Gravity, due to elevated source.

Pumping to an elevated reservoir.

Pumping to a standpipe.

Pumping direct into the mains.

These four systems of distribution are supposed to be named in the order of their merit. The first and beyond all comparison the best in respect to safety or reliability of operation is the gravity system due to the elevation of the source. This system is rarely possible except in a mountainous country. But where it is possible, and is wisely designed and substantially constructed, the operation thereafter is left to the unerring laws of Nature. In cost of operation and maintenance the gravity system has a great advantage over the pumping system, but in a majority of instances in which it is possible the excessive cost of construction equalizes or outweighs the economy of operation. These are matters of simple and accurate calculation, the interest on the capital invested being always regarded as an item of annual and perpetual expense.

Next in point of safety is the system of pumping to an elevated reservoir holding several days' supply, thus creating what may be termed an artificial gravity system and attaining, as long as the reservoir is kept supplied, an exact counterpart of that system, subject only to the additional risk of an interruption of the pumping for a period of time sufficient to exhaust the reserve. The standpipe is simply an elevated

reservoir on a much smaller scale, the risk of interruption being correspondingly increased.

The system of direct pumping may be compared to the beating of the human heart, the entire system being dependent for its vitality upon the unceasing throb of the engine and its ability at any instant to respond automatically to such extra demand as may be created by the sudden opening or bursting of an artery. This system ranks last in point of safety, but is entitled to the credit of conserving its energy and exerting it exactly to the extent that is needed and no more; just as the human heart beats slowly when we are asleep and accelerates as occasion demands during our hours of active life. A combination of the reservoir and direct pressure systems is entirely practicable by the use of a simple device turning on the reservoir pressure only when it is necessary to stop the pumps, and pumping into the reservoir only when it needs to be re-filled.

Filtration

Filtration is a subject upon which volumes have been written, and a science which is still being developed along new and original lines. We are apt to regard clear water as pure water, but the facts do not justify this conclusion. Every water-works system using surface waters should be provided with a filter plant or other device for purification.

The crystal drops drawn from the bosom of the ocean, distilled in Nature's great alembic and distributed over the parched earth in blessed rain, are found to be polluted by the germs which float in our atmosphere. The limpid mountain stream, often referred to by poetic license as a synonym of purity, has been found to contain poisonous germs gathered from decayed vegetable matter upon the mountain slopes. Theoretically, our rivers, on account of their great volume of water and great extent of water-shed having a small population per square mile, would seem to furnish pure water when properly filtered, but practically we find that in seasons of long drought the volume of water is apt to dwindle to the proportions of a mere creek, while the volume of sewage and other pollutions remain unaffected by the seasons.

Lakes, we have none, and our creeks are a variable and uncertain quantity both as to volume and quality.

In conclusion, Gentlemen, permit me to say that the responsibility of furnishing an ample supply of pure water to the fifty millions of human beings who in this country make their homes in cities rests upon the individuals who are elected to administer the affairs of these municipal corporations. In my opinion, this is not a legitimate field for private enterprise with the object of making money. Private corporations embarking in the business of supplying water to great aggregations of human beings do so for the sole purpose of making money for their shareholders; these shareholders are scattered over the business world, caring only for the results as shown by the profit and loss account. They are honorable men; as individuals they would scorn to do a dishonorable act; as individuals, they give liberally to charity and establish ospitals for the cure of typhoid fever, but as stockholders they expect dividends, and as bondholders they demand the pound of flesh nearest the heart. If the League of Georgia Municipalities shall succeed in inspiring every city in our beloved State with a determination to own its water-works system, it will have performed a service well worth all the effort it may cost and one which will redound to the prosperity and welfare of our people for generations yet unborn.

GREATER NEW YORK*

An Exposition of Its Legislative Functions

With very few exceptions every modern city has a legislative body chosen to represent the people and to determine the general character and policy of its municipal administration; but the functions of these legislative bodies vary greatly, and the discussion of their character in New York City resembles very closely a treatise upon snakes in Ireland.

In the early part of the last century, the New York board of aldermen had large powers both of legislation and of administration. But, rightly or wrongly, it came to be blamed for nearly all of our municipal shortcomings, and year by year it was shorn of its prerogatives. Certain of these were transferred to the mayor, others to the administrative departments, others to the newly created board of estimate and apportionment, and still others, constituting by far the larger portion, were taken over by the State legislature itself. The most recent move in this direction was the law passed at Albany last winter transferring the power to grant franchises from the board of aldermen to the board of estimate.

The city charter contains many sections enumerating the powers of the board of aldermen, and one might infer therefrom that it is an important body. It may make, amend and repeal ordinances in regard to a long list of subjects. It may order the acquisition of water works, markets, parks, bridges, tunnels, wharves, public buildings, schools, etc. It may regulate a long list of trades. It may fix the salaries of city officers and perform many other functions which at first glance appear to be very important.

*Paper read before the American Society of Municipal Improvements Convention, held at Montreal, Canada, September 5-7, by Mr. Milo R. Maltbie, Secretary, Municipal Art Commission of New York City.

The restrictions and limitations upon these powers are, however, so great that little discretion is left. In the first place, the board of aldermen has nothing whatever to do with the preparation of the budget. This function belongs exclusively to the board of estimate and apportionment, which considers the wants and needs of the various departments and determines the amounts to be appropriated for the coming year. The budget is then forwarded to the board of aldermen, which is allowed only twenty days to consider it and may only decrease certain items. Even then its action is reviewable by the mayor, and his veto may be overridden only by a three-fourths vote. Further, all bond issues must originate in the board of estimate, and if a majority of all members of the board of aldermen does not vote against a proposed issue within six weeks it takes effect without their approval. Even changes in salaries must first be passed by the board of estimate.

The most important restriction grows out of the requirement that all acts of the board of aldermen—and of every city functionary—must be in conformity with State law. When it is remembered that the State legislature regulates, in greatest detail, every phase of municipal administration, fixing not only the general lines within which the city may act but the minutiæ of municipal administration, it becomes apparent that the board of aldermen has little to do. An examination of its minutes shows that most of its time is devoted to the passage of resolutions which have no binding effect, a few ordinances dealing with matters not covered by State law, the approval of increases in salaries, and bond issues and appropriations (all of which originate in the board of estimate), and the appointment of commissioners of deeds.

The board of estimate and apportionment is a far more important and powerful body. Through its control over appropriations and bond issues it determines the general policy of the city government so far as it is determined by any local authority. If it does not approve a specific plan, it may withhold the funds necessary to give it effect. If it believes that the city needs public baths, additional parks, playgrounds for the children, a municipal lighting plant, free ferries or what not, it has only to authorize the appropriation and the thing is done. And now it possesses the right of granting franchises, whether for street railways, subways, telephones, water, gas, electricity, steam-heating or pneumatic service. It is, therefore, the most important body in the municipal government of New York, and has far more legislative authority than the so called legislative body of the city—the board of aldermen.

The constitution of the board of estimate is unique. It is composed of eight persons; the mayor, the comptroller, the president of the board of aldermen and the presidents of the boroughs of Manhattan, Brooklyn, Queens, Richmond and the Bronx. The first three are elected by the city at large, the others by the different boroughs. In order to give those elected by the whole city a controlling influence, the charter provides that the mayor, the comptroller, the president of the board of aldermen shall each have three votes. The presidents of the borough of Manhattan and the borough of Brooklyn, because of the large population in each of these boroughs, are given two votes each, and the others one each, making a total of sixteen votes. As nine votes are a majority, it is evident that the three officials elected at large can outvote the other five members.

The chief pecularity, however, is that the members of this board are not elected to their positions as such but rather as heads of departments. The mayor is the chief administrator of the city; the comptroller is the financial head of the city; the president of the board of aldermen presides over that body; and the borough presidents are chiefly concerned with local improvements. However unusual may be its character and organization, the board of estimate thus far has given very satisfactory results, and its decisions generally commend themselves to public approval—certainly to a far greater extent than those of the board of aldermen.

The chief legislative body for the city of New York is the state legislature, a *State* and not a *local* authority. If anything of importance is planned, power must be obtained from Albany, and not infrequently party politics is a far more important factor in legislative councils than the welfare or preferences of the city. Every session is clogged with measures affecting New York City, in the main passed and lobbied for by persons who have peculiar reasons for wishing them enacted. The city has found it necessary to keep a special representative at Albany, a skilled lawyer and ex-senator, to protect the city's interests. Notwithstanding, legislative interference has gone so far that two-thirds of the expenditures in the city's budget are mandatory, that is, the city authorities have no choice but to include these amounts; they are required to be paid by State law. Of the remaining one-third nearly one-half is practically mandatory, so that only about one-sixth of the city's budget is entirely in the hands of the local authorities. Evidently, home rule is largely a myth.

The results of such conditions have been disastrous both for city and State and will continue to be so until some system is established which creates local responsibility. How can one expect that local matters will receive due consideration from those who are in no way responsible or amenable to the locality concerned? The remedy, therefore, is home rule—preferably constitutional home rule—upon the Missouri or California plan, where each city has the right to make its own charter. This implies some sort of local legislative body, which shall have full and complete authority to determine the general policy of the city, to make appropriations, to issue ordinances or order public works, in a word, to deal fully with every local matter or need which may arise. The exact nature of this body will largely depend upon local conditions. Chicago believes it wise to build up its council—a body similar in constitution to the New York board of aldermen. New York will probably find it preferable to develop its board of estimate into a truly representative body by certain modifications and to abolish the board of aldermen. The board of estimate, at present, is illogical and out of harmony with the inherited theories of government, but its record is good and if made more representative it would doubtless become an ideal legislative body.

DISPOSITION OF MUNICIPAL REFUSE*

American Conditions Illustrated by Data from Representative Cities

I.—Present Conditions of American Waste Disposal

The Times, of London, England, March 5, 1905, makes this observation on American waste disposal methods:

"Whilst the refuse-destructor has attained a recognized position in this country, and its value is acknowledged on all hands from an economical as well as a hygienic point of view, the situation regarding similar appliances in the United States is in singular contrast to the progress made in this country in the utilization of towns' refuse. The chief of the causes assigned for the backwardness in this respect is concerned with the politics of the United States municipalities, by which municipal engineering and sanitation are controlled to a large extent by considerations which have no reference to their individual advancement and well-being. Contracts relating to such engineering works are found extremely difficult to obtain on any satisfactory basis, and still more difficult to successfully carry out, with the result, as stated, that an important branch of engineering practice in the United States is, and seems likely to remain, many years behind that of Europe."

The above statement, from such a source, is an indictment of the prevailing practice and methods in waste disposal in America that cannot be ignored.

It is, in effect, a charge that municipal authorities have allowed the considerations of party politics, the deals and "swaps" of personal influence, the pressure of selfishly interested parties, and the veiled or direct offers of contingent financial advantage to govern their action in regard to the matter. This evil extends much further when the city fathers grant a long-term contract or franchise at high rates of payment, developing into a monopoly holding on to the franchise with a grip almost impossible to dislodge later on.

These facts are only too well known to American engineers, and the discouraging results attending disposal work for twenty years past give good grounds for such charges as come to us from outside observers.

For eighteen years the subject of waste disposal has been under examination and discussion by this Association. The papers, addresses and debates published in its transactions have dealt with its various phases as they have developed in the single instances of cities and towns, showing the slow, imperfect development of the art under many adverse conditions, and the application of many varied forms, methods and apparatus.

These papers and discussions evidence a sincere effort to obtain the best means of disposal, but in the main it must be candidly confessed that the expectations and hopes which have been raised have not as yet been fully realized. Some later papers presented here have given a great deal of information in regard to existing conditions, and pointed out the necessity for improved methods, but they have not clearly indicated exactly what course should be pursued in order to better the conditions.

In other associations, such as the League of American Municipalities, the American Society of Municipal Improvements, and the Civil and Mechanical Engineering societies, this subject has been written about and debated upon with the help of some of the highest engineering experts and authorities from abroad, whose reports, though not conclusive as to the means that should be adopted, have been of service for information in regard to the general questions involved.

The whole question of economical and efficient methods of municipal waste disposal is just at this time in a changing, unsettled state; the tendency is consequently to "go slow" and not to commit the city to the adoption of schemes and plans that have not been thoroughly tested by practical use or that cannot be recommended by the endorsement of those competent to report upon the particular conditions governing each individual case. But the subject is now being seriously taken up by universities and colleges, special engineering training being given along the lines of the scientific disposal of city waste, and we shall soon have a large corps of young men thoroughly grounded in the best methods used here and abroad, whose services in this line will hereafter be invaluable to the municipalities.

Sanitary waste disposal affects the pocket-book as well as the health of the public, and deserves and should command the same attention and expenditure of money to bring it to a successful issue that is considered necessary in every other department of city administration. In four or five instances where the question has been approached from the side of economy and efficiency in service, and where, with the aid of expert knowledge, modern disposal plants have been installed, there have been marked advances over former unsatisfactory methods and results, and the benefits enjoyed have been creditable alike to the city and to those connected with the work.

It may not be out of place to note a few points connected with this work, the result of observations extending over some years of practical experience and investigation of the subject, and these points are offered as suggestions for future investigations and reports.

1.—An intelligent study of local conditions is absolutely necessary. A clear idea of the class and character of waste to be dealt with should be obtained, and the vague statements of cartloads usually submitted must be reduced to some known standard of measurement, such as cubic yards or tons, and the information tabulated for future use.

*Paper read before the Thirty-third Annual Meeting of the American Public Health Association, held at Boston, Mass., September 25-29, by W. F. Morse, Sanitary Engineer, New York City.

2.—It should be decided which method or system will give the most efficient service. The knowledge obtained by the intelligent study of local conditions will largely guide in selecting the best means of disposal. It should be borne in mind that no two communities are exactly alike, and that a method which may be perfectly safe and efficient in one town may be totally unfit for another.

If this question cannot be easily settled, some one with training and experience, whose judgment and reports can be relied upon, should be called in to examine the situation and make recommendations. The whole question is assuming a place in municipal affairs which demands skilled and scientific treatment and more direct responsibility.

3.—The means of disposal having been selected, the municipality should draw up its own specifications, stating clearly exactly what is wanted, and the conditions for tenders. All theoretical and "on paper" plans should be eliminated. Three hundred and twenty-five patents for waste disposal have been issued in the United States, and every man who has obtained one apparently thinks himself entitled to have its value demonstrated at the expense of his fellow townsmen. This is the chief reason why years of time and great sums of money have been spent on worthless, insanitary schemes. In the work of waste disposal, as in commercial enterprises, it should be emphatically "the survival of the fittest."

4.—When a method or system is completed it is entitled to a fair trial. To pre-judge the whole and to prejudice the community is unfair and unwise; but should the conditions of the contract not be fulfilled there should be no palliation of the failure, and the rights of the city, for its own protection and that of other places, should be rigorously insisted upon.

5.—There should be instituted and maintained a systematic oversight of the methods in use, the returns, good or bad, being tabulated for public information and for the help of other communities. The annual reports of the sanitary officers and inspectors at the meetings of the British sanitary and municipal associations are of immense service, as they contain definite results of disposal methods which help to guard others from error and facilitate the introduction of means and apparatus known to have stood the test of actual use.

With the use by engineering skill of the data which may be collected by the means indicated there can be no doubt of the attainment of good results. Now we know what not to do; the future should show us what to do, and how to do it.

II.—The Disposal of Municipal Rubbish

There is one phase or sub-division of waste collection which has been more carefully examined within the past three or four years than formerly, the reported results of which will be of interest and service. This is the collection, treatment and final disposition of rubbish or light refuse, or that part of municipal waste which is neither garbage, ashes nor street sweepings.

In three large American cities this work has been carried on by the use of special apparatus which receives all the rubbish, recovers the saleable portions and destroys the worthless residue, utilizing for various purposes the heat derived from its combustion.

As a basis for computing the relative quantities of city waste products the following table has been carefully compiled from the latest reports and returns:

Total Quantities, Garbage, Ashes and Rubbish per Annum in Four Cities.

	Total Amount collected per annum.		Quantities per 1,000 Population.			
	Loads.	Tons.	Population.	Loads.	Tons.	Amts. per capita per annum in lbs.
New York: Boroughs of Manhattan and Bronx	1,798,747	1,656,812	2,530,000	710	654	1,313
Boston	392,422	329,059	530,000	740	620	1,241
Buffalo	59,374	204,861	373,000	159	548	1,098
Brooklyn	589,477	330,870	1,394,000	423	238	477

Beginning with these figures as representing the total quantities, and considering separately the only places, New York, Boston and Buffalo, where the rubbish has in part been separately collected and disposed of, a review of the work done in these cities will afford a good idea of the quantities to be handled and the methods of dealing with them applicable to other cities in a like situation.

New York City

Table Showing Approximate Relative Quantities, by Volume and Weight, for Each 1,000 Persons per Annum, in the Boroughs of Manhattan and the Bronx.

	By Volume.		By Weight.		By 1,000 Population.			Weights.	
	Loads.	Per cent.	Tons.	Per cent.	Loads.	Tons.	Per capita, lbs.	Loads.	Cub. yds.
Garbage	224,248	12.8	201,335	12.1	88	79	159	1,800	1,200
Ashes	1,336,456	74.2	1,336,456	80.7	528	528	1,060	2,000	1,500
Rubbish	238,043	13.0	119,021	7.2	94	47	94	1,000	155
Totals	1,788,747	100.0	1,656,812	100.0	710	654	1,313	.....	.....

New York City was the first to experiment with this matter, as Col. Geo. E. Waring, when Commissioner of Street Cleaning, built a small disposal station that received the rubbish from three districts containing a population of 116,000, and continued this for two and one-half years. The station was built by the city and operated under contract through competition, the revenue to the city being at the rates of 59 cents, 61 cents and $1.10 per ton for the three years.

In respect of the recovery of valuable material that had previously been wasted it was a successful experiment, but

upon the incoming of a new city administration the station was abandoned and the rubbish turned over to a favored contractor who, in the course of the four following years, derived large returns from it for the benefit of those interested. Subsequently, Dr. Woodbury, the present Commissioner, caused to be built on a pier at West 47th street a similar disposal station, which after numerous changes and alterations is now doing creditable work. The cost of this plant was approximately $25,000. It includes a steel building containing an incinerator with three connecting cells, fed by hand, a conveyor for the separation of the rubbish, and steam boilers for utilizing the heat derived from combustion.

A clear idea of the results attained can be had from the following epitome of the report kindly furnished me in advance by the Commissioner. In this, the trials or tests made October 7, 1904, for one half-day, are taken as a standard of measurement for quantities and steam power, and furnish data for the amounts of rubbish when taken in conjunction with the reports from the 30th street dumps, where the rubbish is also sorted but the residue disposed of in the old manner by dumping.

REPORT OF OPERATION OF 47TH STREET RUBBISH DISPOSAL STATION.

Collection. Quantities Received.			Quantities Received and Disposed of, and Steam Power Developed. Separated. Classes. Pounds.								Disposition. Quantities Burned, in pounds.		
Loads.	Cub. Yards.	Weight, lbs.	Paper.	Cardboard.	Rags.	Other Saleable Articles.	Non-combustible (Iron and Glass.)	Combustible (Wood.)	Total, lbs.	Per cent.	Wood.	Paper.	Per cent.
54	334½	52,630	9,047	4,909	1,007	1,656	2,305	4,220	23,150	48.8	6,394	17,881	51.2

Total picked out, 23,114 lbs.; 48.8 per cent. by weight, 63.5 per cent. by volume.

Total burned, 24,275 lbs.; 51.2 per cent. by weight, 36.5 per cent. by volume.

Total ashes from combustion, 3,529 lbs. = 6.8 cubic yards, at 519 lbs. per yard.

Per-centage of ashes of amount burned, 10.7 by weight, 3.1 by volume.

STEAM POWER DEVELOPED

Tests of Boiler Power, Average of Three Trials, 2, 3 and 4 Hours, for One Day.

Mean temperature of feed water	50°	F.
Steam pressure per square inch	80	lbs.
Quantity of fuel burned, wood and paper	12,384	"
Quantity of water evaporated at 212° F	21,843	"
Horse power per hour	190.0	H.P.
Evaporation per pounds of refuse from and at 212° F.	1.66	lbs.
Horse power per square foot of grate (104 square feet area)	1.24	
Horse power per cubic yard of rubbish burned	4.93	H.P.
Power developed in excess of demand	200	"

FINANCIAL STATEMENT

Income.		Expenses.	
By saving on former method of disposal, per week	$210.00	To cost of labor	$127.19
By electric light utilized, per week	4.00	Supplies, etc., and interest on plant	38.46
	$214.00		$165.65

Net income per week	$48.35
Total return per annum	2,514.20
Value of steam power not utilized	8,000.00

This report gives no value of the sorted rubbish, which is placed by the Commissioner at $3.20 per ton paid by the contractor for the privilege of sorting.

By tabulating this report, and adding to it the data from the 30th street station, a clear idea of possible results may be realized.

QUANTITIES AND PER-CENTAGE OF RUBBISH RECEIVED AND DISPOSED OF AT 47TH STREET AND 30TH STREET STATIONS, EXTENDED TO ONE YEAR OF 300 DAYS.

	Collection.			To be Picked, 48.8 per cent.		To be Burned and Dumped, 51.2 per cent.	
	Loads of 6.9 Cubic Yards.	Cubic Yards of 155 lbs.	Tons.	Cubic Yards.	Tons.	Cubic Yards.	Tons.
One Year.	38,850	268,065	19,425	130,816	9,479	137,249	9,946

If the total annual collection of rubbish in these boroughs were treated in a similar way the figures would rise to large proportions. There are 119,021 tons; deducting from this 10 per cent. for contingencies leaves 107,119 tons, of which 48.8 per cent. is picked out, leaving 51,410 tons available for market. On the basis of $3.20 per ton, as above, this represents a total of $164,076 as the market value of the recovered material. If to this be added the present cost for transportation the total saving by establishing this method in all the city would approximate $200,000, without taking into account the value of the steam power to be developed.

BOSTON

The approximate quantities of waste annually collected in Boston and the relative amounts per 1,000 of population are shown in the following table:

	Total Collections.					Disposition (Loads).					Per 1,000 of Population.	
	Loads.	Per Cent.	Tons.	Per Cent.	Delivered to Reduction Co.	Taken by Contractors.	Dumped at Sea & Land.	Delivered to Refuse Plant.	Tons.	Per Cent.	Loads.	Tons.
Garbage	64,744	16.5	80,929	24.6	49,219	15,525					122	152
Ashes	289,933	73.8	232,881	70.8			289,933				545	439
ubbish	37,746	9.7	15,249	4.6			21,871	15,875	7,427	48	73	29
Totals	392,423	100.0	329,059	100.0	49,219	15,525	311,804	15,875	7,427	48	740	620

The rubbish of the city of Boston was formerly disposed of by dumping at sea, giving rise to nuisance on adjoining beaches. The movement for better conditions made by the City Board of Health in 1896-97 led to action by the city in 1898-99, at which time a contract was awarded to a private company formed for the purpose of disposing of the rubbish for a period of ten years, the city reserving the right to purchase the plant. A description of this plant and the results anticipated at the time of its completion were given in a paper at the meeting of this Association in Minneapolis in 1899, and it is only necessary to briefly refer to it here.

The building is on Atlantic avenue, in the heart of the city. It is of brick, 200 feet by 70 feet, and contains a picking belt or conveyor for sorting the rubbish into the various classes, power presses, and a destructor for burning the worthless parts. The heat from the destructor operates the steam boiler, supplying power for lighting and heating the plant and operating the machinery.

The rubbish is collected daily from business, manufacturing and residential portions of the city, a district containing approximately 200,000 persons and ninety miles of streets, by seventeen large wagons and thirty-one paper carts, and includes every form of waste except garbage, ashes and street sweepings.

The amounts separately collected in the last five years and the relative amounts utilized are as follows:

Yearly average number of loads, 17,646, weighing 996 pounds each; delivered at station 16,447 loads, approximately 8,053 tons.

This collected amount is about 48 per cent. of the total quantity produced in the city; the balance, 8,724 tons, or 52 per cent., being dumped with the ashes on low ground. The separated portions are approximately 47 per cent. by weight, and 63 per cent. by bulk, and are saleable at current market rates.

The city receives the greater benefit from this system of disposal, as the delivery at this station is less costly than at any other point, and the sanitary disposition is a great advantage over the former methods with their attendant nuisances and consequent complains.

Buffalo

The official reports of Col. F. G. Ward, Commissioner of Public Works, and of Mr. C. M. Morse, Deputy Engineer Commissioner, contain the figures for the Buffalo garbage and waste collection and disposal for the year ending June 1, 1904. During the first two months of July and August the work was done by the city, but the new contract with the Buffalo Sanitary Company for the collection and disposal of all the ashes, refuse and garbage came into effect in September, 1903. One condition of this was the erection of a refuse disposal station on city ground in conjunction with the sewage pumping station. The heat from the destructor is to be utilized by the boilers of the sewage plant, for which a payment of $9,600 per annum is to be made by the city. The plans and designs presented by the speaker were accepted for the installation of the refuse disposal station, and the plant was completed and began work in May, 1905.

The building is 200 feet long, 50 feet wide, and 25 feet high, with brick walls and steel trussed roof. The rubbish is collected in large carts holding fourteen cubic yards, and is dumped on the floor, where, after roughly sorting out the bulky and incombustible matter, it is placed on a conveyor or picking belt and carried up an incline to the sorting floor, passing for a length of fifty feet between bins or picking boxes, into which the several varieties of paper, cardboard, rags, glass, leather and rubbish are picked or sorted out. The remaining portions, comprising small bits of paper, wooden berry boxes, excelsior, straw and other combustible material is carried on by the conveyor up another incline, and passed through chutes into the charging holes of the destructor. When the conveyor is running the stream of combustibles is constant, and no hand-feeding is required.

The furnace, of special design, is 35 feet long, 12 feet wide and 13 feet high, with exterior doors for stoking and removing ashes. The interior is provided with a system of double fire-brick parallel grates of large capacity, the combustion being assisted by a forced draft of air from a blower under the front ash-pits. During the first four months before the sewage plant was ready for work, a 60-hp. vertical boiler was used for the operation of the refuse plant, driving the conveyor and baling presses and operating a dynamo for lighting purposes. There are three steel power presses for baling the waste. The whole construction is of the best material; steel and concrete being used instead of wood and making the plant fireproof throughout. The chimney, built of radial bricks, is 125 feet high, and five feet in diameter, and is connected with the steam boiler of the sewage plant.

Quantities, Collection and Disposition of Garbage, Ashes and Rubbish at Buffalo, N. Y., for 1904.

	Collection.					Disposition.						
							Delivered to Reduction Co.	Tipped on Land.	Delivered at Station for Two Months.		Per 1,000 of Population.	
	Loads.	Per Cent.	Cubic Yards.	Per Cent.	Tons.	Per Cent.	Tons.	Tons.	Cubic Yards.	Tons.	Cubic Yards.	Tons.
Garbage	6,388	11	30,000	7	21,029	10.2	21,029				80	56
Ashes	37,515	63	222,513	55	166,885	81.5		166,885			597	447
Rubbish	15,474	26	157,653	38	16,947	8.3		14,086	27,325	2,937	422	45
Totals	59,377	100	410,166	100	204,861	100	21,029	180,971	27,325	2,937	1,099	548

The delivery of the rubbish at the Utilization Station is made by large carts holding fourteen cubic yards, and these are unloaded in the average time of twelve to fifteen minutes by an ingenious device, operated by power.

The weight of rubbish in Buffalo is considerably more per cubic yard than it is in other cities, and a large proportion of dust and worthless matter is collected which has afterwards to be removed.

QUANTITIES OF RUBBISH COLLECTED AND DISPOSED OF IN BUFFALO DURING JUNE AND JULY, 1905.

Collection.				Disposition.				
	Removed before		Net Amount Handled.	Packed	Burned.			
Cubic Yards.	Treatment.	Per Cent.	Cubic Yards.	Cubic Yards.	Per Cent.	Cubic Yards.	Per Cent.
27,325	1,337	21	25,998	11,399	40	15,598	60

No report of the amount of steam power is obtainable at present, as the sewage plant is not yet ready for operation, but here, as in Boston, a 60-hp. boiler furnishes power for all the needs of the station, including electric lights, and there is a surplus of 30-hp. unused.

BROOKLYN

Rubbish disposal in this city is effected by a company having the contract for collection and removal for five years. The ashes and waste, separately collected by the City, are delivered at thirteen stations in various parts of the city and the paper refuse is roughly picked out, the residue being taken by trolley to low ground at Sheepshead. One station has a small incinerator which destroys the worthless parts, and additional small furnaces may be built. The City pays the Company 39 cents per cubic yard for this disposal. No accurate record of quantities sorted out or destroyed can be obtained, but in general the quantities of waste as reported by the street cleaning department are as follows:

	Collection.				1,000 of Population per Annum.						
	Loads.	Per Cent.	Yards.	Per Cent.	Tons.	Per Cent.	Cub. Yards.	Tons.	Lbs.	Loads.	Cub. Yards.
Garbage	90,330	15.3	135,495	14.5	81,297	24.6	97	58	117	1,800	1,200
Ashes	402,417	68.2	603,625	62.	201,208	60.8	433	144	288	2,000	1,500
Rubbish	96,730	16.5	225,825	23.5	48,365	14.6	162	35	72	1,000	155
Total	589,477	100.0	964,945	100.0	330,870	100.0	692	237	477		

NOTE.—The rubbish is rated and paid for by the city at 2½ cubic yards per load (or 400 lbs., which is about 40 per cent. of the whole load) at 39 cents per cubic yard. The reports of collections show the volume of a load to be 6½ cubic yards, weighing 1,000 lbs., and this has been taken as the basis for computing the total amounts. The difference may be taken to represent the per-centage of rubbish not saleable.

The reports of quantities, etc., in these four cities have been separated from the general reports, to give some idea of relative proportions and classes. It is a matter of great difficulty to give accurate figures, and some surprising and perplexing comparisons can be made, illustrating what has been before said—that each city and town has its own special conditions, which must be studied carefully to arrive at any sure conclusion. It is hoped that these statistics may lead to investigations in this line at other places.

The conclusions to be drawn from the reported results of the application of modern methods of rubbish disposal in these cities may be thus briefly stated:

There is in every large city a proportion of rubbish, averaging 10 per cent. of the total municipal waste, that can be separated from the general mass by the householder and delivered to the city collection carts in a comparatively clean condition.

This rubbish can be more rapidly and economically collected from a wider extent of streets than can ashes or garbage.

It can be treated at almost any point within the city limits, without nuisance or offense to adjoining property-holders, thus insuring short haulage.

The recovery of the saleable parts will afford a revenue, and if carried on by the city will earn it dividends of considerable magnitude.

This method of disposition does away with the complaints that arise from the practice of dumping at sea or on land, and as it is perfectly sanitary in operation it cannot itself cause complaints of a similar nature.

Disposal by properly constructed furnaces will develop steam power for municipal use or for sale to private parties.

The system of separate rubbish collection and disposal assists the collection and disposal of the other city wastes by removing a great bulk of refuse otherwise interfering with the successful treatment of garbage and ashes.

LEAKAGE AND WASTE

UNDER this caption, "The Citizens' Bulletin" (Cincinnati) of September 16th publishes an article in which the adoption of the meter system is urged as the one effective remedy for the excessive waste of water in the City's municipal water-works system. The extracts given below fairly represent the tenor of the article, with which the MUNICIPAL JOURNAL, it need hardly be added, is in hearty agreement:—

If Cincinnati were enjoying a business administration the meter system of measuring the amount of water used by each consumer would long ago have been introduced. It is the only sensible and equitable plan. Under it each consumer would pay for the actual amount of water used by him. Some consumers would not be charged, as they are now, for the water wasted by others. The waste of water, under the antiquated system that Cincinnati still clings to, must be something enormous. It is but natural that it should be so under the present flat-rate charge. The cost being the same, regardless of the amount consumed, but little heed is paid to confine the number of gallons used to actual needs or to prevent leakage and waste. . . . We have frequently heard it stated—and have no doubt that it is true—that if our water-works were in the hands of a private company it could furnish water at half the present charges and pay handsome dividends to its stockholders. The first thing the private company would unquestionably do—if within its power—would be to introduce the meter system and make every consumer pay for the amount of water he actually consumed.

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Municipal Ownership

AN indication of the extent to which American public opinion has become interested in the ownership of public utilities is furnished by the prominence of this subject in the Toledo Convention of the League of American Municipalities. Not only was it the staple of Mayor Dunne's forcible and timely exposition of present conditions in Chicago and a leading factor in Mr. Powers' discussion of municipal finance and accounting, but its influence was to be observed in the papers by Mr. J. W. Wood and Mr. James Montgomery Rice, dealing respectively with special phases of municipal activity. And, dealing with the general rather than with the particular, no one attending the Convention and coming into personal contact with the large number of delegates present could doubt that municipal ownership was in the air or that the representative gathering was almost a unit in favor of that condition.

While this unity of sentiment may be accepted as a proof of the strength which the American municipalization movement has attained, it is in one sense unfortunate that the opposition to municipal ownership was not more effectively, even if less forcibly, presented at the Toledo convention. Discussion is the life-blood of truth, and nothing is better calculated to inspire confidence in the justice and inherent soundness of a proposition than the fact of its having successfully withstood the onslaughts of interested, prejudiced or unreasoning opponents. There is additional force in this dictum as applied to the question under review, inasmuch as not all of the advocates of municipal ownership in this country are fully aware of the arguments, pro and con, which have resulted, on the one hand, in the wide-spread adoption of the municipal idea in Great Britain and, on the other, in protests both loud and deep against its further extension. We do not propose to enter, even briefly, upon an exposition of these conditions, but it may be well to point out that an important factor of the call for rest is the extent to which borrowing has been indulged in by English local governing bodies in the furtherance of municipal trading projects. It is reasonably certain that the zeal of British enthusiasts has outrun their discretion in certain instances and that there was ample justification for the alarmist attitude assumed by Mr. Austen Chamberlain, Chancellor of the Exchequer, in presenting his annual Budget in the House of Commons last year. The warning then sounded, however, to the effect that the extravagant borrowings of local bodies was impairing the credit of the State and that, sooner or later, it would be necessary to call a halt in the process of mortgaging the future, was merely the public exposition of a condition previously realized by those having a knowledge of the facts. Given similar conditions, the same result might follow the general adoption of the municipal idea in this country, and it is for those who are aware of what has gone before to do what lies in their power to prevent its recurrence, in other words, to profit by experience.

There is an added reason for unremitting solicitude in this respect in the greater diversity of State laws and the larger degree of freedom enjoyed by American local bodies, as compared with the rigid uniformity and the paternal central control so well known as inseparable from British forms of legislation and administration. As will be seen from what appears above, even the strict supervision of the Government Department known as the Public Works Loan Board has failed, in the past, to restrict British local borrowings within reasonable limits, and it is interesting to note the policy of the Board, significantly emphasized by an official order dated March 3rd, 1904, in discouraging long-term loans and penalizing them by higher rates of interest. The order in question fixes this rate at 3½ per cent. per annum for twenty-year loans and gradually increases it to 4¼ per cent. in the case of fifty-year loans. More than this, the Board has refused some applications for loans on account of the existing burden of taxation in the areas affected and has warned applicants, in other cases, that this result would follow unless the tax-rate were reduced.

It may well be urged that these conditions are remote, in so far as this country is concerned, although what is known as the loan limit is already a feature of many State statutes. What is of more immediate concern is to ensure that discussion of this important subject shall not be beclouded by false issues and misleading comparisons and that supporters of one side or the other shall approach its consideration with a full appreciation of the ease with which well-meaning advocacy is apt to degenerate into ill-informed and dangerous partisanship.

The Toronto Franchise

WE comment above upon the more general aspects of municipal ownership, and desire to direct the attention of our readers to the particular phase of it dealt with in the lucid and in every way admirable paper laid before the Toledo Convention by Mr. Francis S. Spence, reproduced in this issue. The feature of Mr. Spence's paper which will appeal to a large class, students and authorities alike, is the

conclusion at which he is constrained to arrive in spite of the brilliant financial results accruing to the city of Toronto from the operation of the street railway franchise awarded by it to the corporation concerned. Except in so far as relates to the prevention of undisguised and unblushing stock-watering, the provisions of this franchise are almost a model for similar concessions, having brought about an excellent service and a clear revenue of over $1,000 a day to the city exchequer. The last-named item is, indeed, so abundantly satisfactory that it appears to be generally recognized that a change from private to public ownership would reduce its amount, and yet, notwithstanding this, Mr. Spence is himself an advocate for, and represents the general attitude of the city therein, the assumption of direct operation by the city on the termination of the franchise term. He takes that ground with a full realization of the fact, not always adequately appreciated by thick-and-thin supporters of municipalization, that there are objections even to the best attainable kind of public control, a fact alone sufficient to show the judicial frame of mind in which he approaches the question.

An instance of this kind, in which the conditions favorable to a continuance of private operation are such as would not readily be duplicated, is significant testimony to the gravity of the present situation in American cities generally. It is on that account that we regard Mr. Spence's well marshalled statements and conclusions as deserving of earnest study by everyone immediately or prospectively concerned in this development of civic administration.

Sewage in the Courts

A SUIT which has been in the courts since the spring of 1902, concerning the validity of patents covering the septic treatment of sewage, has reached a stage at which a decision has been given by the United States Circuit Court of Appeals. Brought by the American Sewage Disposal Company, of Boston, against the City of Pawtucket, R. I., it charged that the city, in carrying out sewage disposal works of which the septic system was a feature, had infringed the Glover and other patents held by the Company. The issues involved not merely the question whether an actual infringment had been committed but the far more subtle question as to how far the Glover patentee had been aware of the basic principle which, as is now matter of common knowledge, is at the root of bacteriological sewage treatment. So far as we can gather from the particulars now available, there can be no doubt as to the identity of the invention with what has, since the issue of the patent, been commonly and successfully applied in this field of engineering—a statement applicable also to the *fosse Mouras* designed by and named after a French investigator nearly a quarter of a century ago. But it would appear that it is incumbent upon an inventor, under the United States Patent Law, to demonstrate that he was aware, at the time of filing his application, not only of what he claimed for his invention but of the why and wherefore of its attributes and possibilities. The effect of this provision in the present instance is to leave the matter, even after the judgment now referred to, in a condition resembling that produced by a celebrated ecclesiastical curse, when "nobody seemed one penny the worse." This impression is confirmed by the probability that an appeal to a still higher court will be required to determine the knotty problems involved in the case. Meanwhile, various other cities have good reason to wish for an early settlement of a dispute which naturally tends to induce hesitation and delay in deciding on sewage schemes more or less dependent upon septic action at one or other of its stages.

Brick Paving

THE notes, on another page of this issue, dealing with the methods of brick paving in use at Cleveland, Ohio, could probably be duplicated, in all essential parts, by the experience of many other cities. But what has been done in Cleveland is of a character not only entitling it to specific mention in this connection but qualifying it for the careful study of others, councillors and officials alike, who are not above taking a leaf out of extraneous experience and thereby putting themselves in a fair way to add to their own.

There will be many opinions concerning this or that feature of Cleveland practice, and it is a truism to state that in this diversity of individual judgment will be found the best if not the most direct avenue to a solution of the major and minor problems involved. But there will probably be a general agreement, approaching unanimity, that the present time is peculiarly appropriate to the discussion of the most efficient "filler" for this class of street pavement. Not only have paving bricks secured a much more extensive field than was at one time looked upon as possible, but a modern innovation in street-cleaning methods—the use of pressure sprinklers or flushers—seems to have put out of court the old-time plan of relying upon sand as a jointing medium. Those who have watched the action of the spreading jet upon street surfaces will have no difficulty in realizing that this effective combination of sprinkling and cleansing demands something more than a loose and unstable material in the interstices of any pavement to which it is applied. That being so, the selection of a suitable substitute is forced upon city authorities, from whom we shall welcome, for use in our columns, any accounts they may be able and willing to place before others confronted with this problem.

"Municipal Affairs"

UNDER this title, the Municipal League of Los Angeles, a body which has been doing excellent educational work during the last four years, has issued the first number of a monthly magazine, intended to give yet greater publicity to its aims and accomplishments. We welcome this latest addition to the growing number of publications designed, in however humble a way, to spread the light concerning municipal problems and local administration generally. We feel that the present magazine of eight pages, from which advertisements are excluded, will do more than merely enlighten the 625 members now forming the membership of the League, for the indirect gain may be incalculable.

The new organ points out that a degree of responsibility devolves upon the members "to study and watch municipal matters, to find out the real facts, to note the policy of the various city officers—and to remember." The League exists for the purpose of assisting the work on these lines and is

gradually developing a system of records of municipal events, properly catalogued for reference. In this and other respects there is a wide field of usefulness open to a body of this representative character, the more so by reason of the ephemeral constitution of American local governing bodies—a feature which the more sustained and continuous efforts of a permanent institution are eminently calculated to counteract.

A Questionable Ordinance

WE are reminded by the foregoing reference that one of the functions of the Municipal League of Los Angeles is "to take note of the official conduct of members of the city government, commending or condemning as public policy may require," and that the city charter includes a very unusual provision of a similar tendency. It enables twenty-five per cent. of the constituency of an elective officer, on becoming dissatisfied with his official conduct, to petition for his removal, the next step being an election in which the assailed individual may present himself as a candidate against all comers. While it is stated that this provision has not resulted in the underhanded warfare and insidious machinations which it is so obviously capable of fomenting, we venture to express a doubt whether a weapon of this kind should be placed at the disposal of every clique or busybody who, for one or other of a multiplicity of reasons, may become possessed of a desire to set up a more or less personal Vehmgericht in these modern days. While these sore-heads may be, numerically, an almost insignificant or even contemptible minority of the body politic, it must not be forgotten that what they lack in numbers is often made up by a persistency worthy of a better cause. For ourselves, we feel bound to express the belief that the remedy for evils which we have no intention of minimizing or extenuating is to be sought rather in the methods of the Municipal League than in charter provisions calculated to add a new terror to public office.

Engineering Specifications

IN devoting a portion of his Toledo Convention paper on asphalt pavements to the subject of specifications for constructional work, Mr. Andrew Rosewater, of Omaha, touched upon a subject, well-worn it is true, but on which all that has been said before may apparently be reproduced, with "damnable iteration," and yet fail to exert the practical effect desired. As the paper is published in the present issue, we need not quote from it or do more than direct the attention of our readers to the statements made in regard to the evil consequences arising from ignorance, neglect, or worse in the drawing up of a document forming the basis of a contract. The engineer occupies a position midway between the city and the contractor, and though it is true that he is there exposed to flying shots from each that fact in no wise absolves him from the obligation of "seeing fair" between them.

Much of the occasional unpleasantness to which we have alluded can be obviated by that far-sighted attention to the drafting of the specifications which Mr. Rosewater had in view in deprecating "the vague terms" too frequently encountered in those documents. We have more than a suspicion that trouble frequently arises from the practice of using earlier specifications as a groundwork for later work, the temptation being to make as few changes as possible in a document on which much thought and labor have already been expended. Be that as it may, we imagine that not contractors alone are under an obligation to the author of this paper for his outspoken remarks in this connection; city governments, for instance, may well lay to heart his conclusions as to the party ultimately mulcted for the apparently attractive method of paying a contractor in bonds.

An Open Question

THE selection of Birmingham, Ala., as the next place of meeting for the American Society of Municipal Improvements was not brought about, at the Montreal Convention, without a strenuous effort to secure the nomination for Chicago. The latter city had already been chosen for the 1906 Convention of the League of American Municipalities and it is known that exceptional efforts are to be put forth to make that gathering memorable in respect of its dimensions and representative character. Under these circumstances, a joint convention, such as some of the Montreal delegates may have had in view, or a separate meeting of the Society following on that of the League, would probably have fallen flat, so far as the Society is concerned, and it was probably due to considerations of that kind that the offer of Birmingham was finally accepted.

The idea of a joint convention, though not openly put forward, is of special interest on account of the frankness with which the position and claims of the Society are discussed in the address of the retiring President, Mr. Folwell, which we are enabled by his courtesy to publish, in full, in our present issue. A turning point has apparently been reached in the history of the Society, much depending upon the question whether the present membership can be maintained, or even increased. We cordially join in the hope that this can be done, feeling as we do that there is "ample room and verge enough" for both the League and the Society.

Those who seek enlightenment under this head cannot do better than make themselves acquainted with Mr. Folwell's address, in which the diversity of aims, constitution and methods is lucidly set forth, so that he who runs may read.

"THE HIGHER LAW IN THE INDUSTRIAL WORLD" is the title of a timely article in the August number of "The Engineering Magazine," contributed by Mr. H. E. J. Porter and dealing with the gratifying modern tendency towards a more rational treatment of employees in industrial establishments. Typical instances are given, showing that the amelioration of conditions results in benefit not only to those in whose interests they are primarily undertaken but in a distinct gain to the employer and investor of capital. Perhaps in no respect is this more true than in the enhanced standard of general and personal hygiene now being widely, if not yet generally, adopted. "The health of his employees should be of primal importance in the thought of the manager. No one

can work at his best when he is not well. No work can be good when performed by someone who is ailing." Other parts of Mr. Porter's article discuss the "suggestion and premium" system in factories, salesmen's schools carried on under tutors provided by the principals, and other features which, brought into being by the fierce rivalry of these days, are among the most hopeful alleviations of its otherwise far from humanizing influences.

Mr. Porter, eldest son of Gen. Fitz John Porter, is an industrial engineer of wide experience, now located in New York City, and abundantly qualified to speak with authority on the phase of commercial life selected as his theme.

♣

MUNICIPAL GAS AT RICHMOND, VA., appears to be a remunerative investment if we may judge from a report, by Superintendent W. P. Knowles, dealing primarily with last year's operations. With receipts, from 1867 to 1896 inclusive, of $5,272,906 and a total outlay during that period of $4,098,051, there remained a surplus of $1,174,855 or, adding the value of gas used for public purposes, less interest on cost of works, an actual surplus of $1,532,930 as the amount which should be credited to the works for the thirty years. It appears to have been the practice, since 1896, to add a fixed sum of $40,000, as interest, to the annual expenditures, the net result being given as $930,025 "total profits to January 1, 1905." As regards the year 1904, more especially covered by the report, there was a surplus of $84,440, an almost uninterrupted increase in this figure being shown since 1897, when it stood at $41,973—less than half the present amount.

♣

MAYOR SILAS COOK, OF EAST ST. LOUIS, ILL., a prominent figure at the Toledo Convention, headed the largest delegation—twenty-eight in all—from any city represented at that gathering. In an interview reported in the local *News-Bee*, he stated that his city was far from being a model in regard to public utilities, none of these being owned by it. Even the water-works are in the hands of a company. But, he added, the Company possesses a fine system, in which sand filtration, without the use of chemicals, clarifies the Mississippi water so that visitors take it for crystal lake water.

A graceful action on the part of Mayor Cook, in waiving his undoubted claims to the Third Vice-Presidency of the League, left the way clear for the election of Mr. F. S. Spence, of Toronto, a distinction happily acknowledged by that gentleman in the remark that he could never expect, in his own country, any greater honor that had been conferred upon him on this side of the dividing line.

♣

A LEGAL VOTERS' LEAGUE has been formed at Camden, N. J., with the object of protecting legal voters in their rights and providing better city and county government. The meeting at which the new association was launched included representatives of all political parties in Camden county, and stress was laid upon freeing the various local governments of partisan politics and the many social and economic evils arising therefrom. It was stated that, in Camden city alone, there were 6000 bogus names on the registry lists at the last election. Permanent headquarters are to be opened in a central part of the city.

Personalities

—A. L. Arnold has been elected City Clerk of Ensley, Ala.

—Mr. E. B. Jones, City Engineer of Chatham, Ont., has resigned.

—Mr. John E. Nolan has been elected Mayor of Wylam, Alabama.

—Mr. A. M. Heston, City Comptroller of Atlantic City, has been re-elected.

—Mr. Austin Miller has succeeded Mr. F. L. Dormant as City Engineer of Houston, Tex.

—Mr. William Tunstall has been appointed Superintendent of Public Works at Homestead, Pa.

—Mr. Frank R. Dare, Brookville, Ind., has been elected Water-Works Superintendent in that town.

—Mr. Myron B. Falk has been appointed Consulting Engineer to the New York State Water Commission.

—Mr. Godfrey Sperling, of Boise, Idaho, whose term as City Engineer has expired, has been succeeded by Mr. Z. N. Vaughn.

—Mr. C. E. Douglas, of New Castle, Pa., a graduate of Allegheny College, has been elected City Engineer, to succeed Mr. W. A. Jones, resigned.

—Mr. Robert H. Moth, who has been City Engineer and Superintendent of Water Works at Kenosha, Wis., for the last six years, has been compelled to resign on account of ill health.

—Mr. C. T. Theobald has been appointed City Engineer of Elyria, O. He was formerly with the Engineering Department of the Lake Shore system and is a graduate of Purdue University.

—Mr. Walter S. Woods, who has been First Assistant in the Engineering Department of La Crosse, Wis., has been appointed City Engineer. He is a graduate of the University of Wisconsin and was engaged in railroad work until 1893, when he entered the service of La Crosse.

—Patrick A. Collins, Mayor of Boston, Mass., died on September 14th at Virginia Hot Springs, Va., where he had gone for his health. He was born in Fermoy, Cork, Ireland, March 12th, 1844, and came to America when four years old, living at Chelsea, Mass. At the age of twelve years he entered a carpenter's shop and later went into a law office. From Chelsea he went to Ohio and worked as a blacksmith, but returned to Boston, where he was for eight years an upholsterer. He had been saving money to take up the study of law and finally obtained employment in the law office of James S. Keith. Two years later he entered the Harvard Law School, where he graduated in 1871. While a student he had entered politics, and was elected in 1868 to the House of Representatives, where he served two terms and from there went into the State Senate for one term. He was admitted to the Bar in the year of his graduation from Harvard and declared that he would not hold office for ten years, and kept his word, but remained in politics. Two years later he was chairman of the Boston Democratic Committee, a position which he occupied for two years. His title of General was due to his having served as Judge Advocate General on the staff of Governor Gaston. Under President Cleveland he was appointed Consul-General to London, having refused the portfolio of Secretary of War. He was

elected Mayor of Boston in 1901 and re-elected for the succeeding term, expiring with the present year. Although a thorough partisan in politics, he earned by the impartial and thoroughly business-like administration of his high office the commendation and support of all parties in the city.

♣

H. C. Putnam, Mayor of Brodhead, Wis., has adopted a novel method of overcoming organized opposition to a particular item of improvement in his city. A block of brick paving which was to have been laid by the city had been abandoned because of this opposition. The work would have cost the city about a thousand dollars, and the mayor has ordered the pavement laid at his personal expense, as a gift to the city.

♣

A Correction.—In the reference to "Street Work at Ottawa," on page 126 of the Municipal Journal for September, the impression was given that Trinidad Pitch Lake asphalt is the standard Ottawa pavement for roadways occupied by street railway tracks. It should have been stated that Nepean stone setts, on a 6-inch concrete base, are used within the track allowance.

♣

Convention Dates

October

—American Civic Association, Cleveland, O., October 4-6. Clinton Rogers Woodruff, secretary, 121 South Broad street, Philadelphia, Pa.

December

—American Economic Association, Baltimore, Md., December 26-30. Frank A. Fetter, Morril Hall, Ithaca, N. Y.

♣

Fire and Police Personals

—Frank Peters is the new head of the Fire Department of Humble, Tex.

—Carl McKeeth has been re-elected Chief of the Fire Department of Galesburg, Wis.

—Thomas O'Leary is Chief of the Fire Department of Houston, Tex., succeeding J. T. Arto.

—Martin Liddy is the new Chief and President of the Fire Department of Bernardville, N. J.

—Mark H. Savage has been elected Chief of the Fire Department of Salem, Ore., to succeed D. W. Pugh, resigned.

—Charles Morris has been elected Chief of the Fire Department of North Bergen, N. J.

—J. T. Persall has been elected Chief of the Fire Department of Cordele, Ga., to succeed Z. A. Bolton, who has moved out of the State.

—Fred M. Wheeler has been again elected Chief of the Fire Department of East Norwalk, Conn., to succeed John H. Gorman, who succeeded him last year.

—F. L. Tubbs has been appointed Chief of the Fire Department of Davenport, Ia., to succeed Charles Hartmer, resigned. Mr. Tubbs is a lieutenant in the Iowa Naval Reserve.

—Lewis W. Smith, Chief of the Fire Department of Watervliet, N. Y., died recently at his home in that city. He was a member of the Department for forty-six years and was chief continuously from 1882.

—It was erroneously reported in our September issue that Mr. David Moore was elected Chief of the Fire Department of Ocean City, N. J. Mr. Jerome S. Rush is Chief of this Department.

♣

A List of Committees

President Stagg, of Paterson, N. J., announces the following Committee appointments in connection with the International Association of Fire Engineers: Board of Directors, Chief Rufus Fancher, New Haven, Conn.; Chief D. J. O'Neill, Ridgewood, N. J. and Chief Jno. T. Black, Duluth, Minn. Committee on Exhibits for the Dallas, Texas, meeting: Chief W. G. Puller, Richmond, Va.; Chief Geo. F. Miller, Reading, Pa.; Chief N. F. Magee, Dallas, Tex.; Chief I. L. Homer, Lowell, Mass., and Chief J. J. Mulcahey, Yonkers, N. Y. Chief James McFall, of Roanoke, Va., is secretary of the Association.

♣

The Poor of Dublin

A Lurid light is thrown upon the conditions under which the poor of Dublin and, incidentally, of certain English areas are compelled to live by the report of Sir Charles Cameron, medical officer of health for Dublin, dealing with the year 1903. In that year 39.7 per cent. of the deaths—not merely in the city, but in the whole metropolis—took place in the workhouses, hospitals, lunatic asylums and prisons. The workhouses, it should be noted, are not semi-penal institutions, but the refuges provided under the Poor Law acts for those entirely dependent upon public support. Out of a total of 9047 deaths, no fewer than 1618 occurred in workhouses.

The census of 1901 showed that there were in the city of Dublin 59,263 families or occupiers of distinct dwellings; of these, 21,792, or 36.6 per cent., occupied each a single room. The flourishing Irish manufacturing city of Belfast, with a larger population than Dublin city, had only 697 families or occupiers located in single rooms. On the other hand, Glasgow, which has a large poor population, has 24 per cent. of its families in one-room tenements.

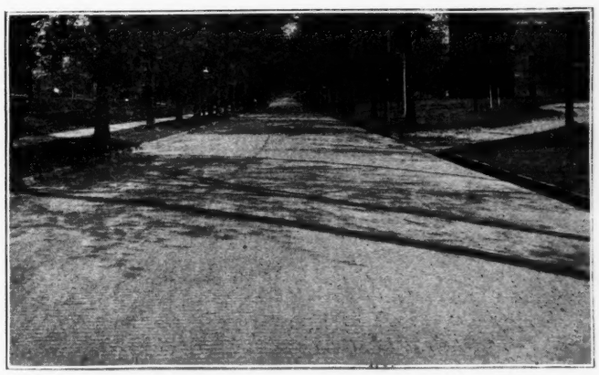
Sir Charles Cameron notes as a peculiarity of Dublin's poverty that while in most cities the purlieus are in a limited number of districts, they are to be found everywhere in that city, even in the rear of the most fashionable streets. He maintains that it is the large proportion of one and two-room tenements which reacts so unfavorably on the general death-rate of the city.

♣

Municipal Street Railways in Newcastle-on-Tyne, England, represent an invested capital of $5,500,000 and include fifty miles of single track. They employ over a thousand workpeople, receiving $431,000 annually in wages. The receipts for the year ended March 31st amounted to $963,000, yielding a gross profit of $345,000 for the year's working. It is proposed to invest $48,000 of the latter sum to form the nucleus of a depreciation fund, a step designed to meet one of the most prominent objections urged against the financial administration of English municipal undertakings.

BRICK PAVING IN CLEVELAND, OHIO

As a consequence of its efforts to secure streets originally well constructed and capable of maintenance within reasonable limits of expenditure, the city of Cleveland has come to be recognized as a leading exponent of brick paving methods. Although local conditions, notably the proximity of the material, are largely responsible for this, there are many features of the work, as there carried out, which possess an interest for cities less favorably situated in this respect, but which may find it advisable to give brick paving a larger amount of consideration than it has hitherto received.

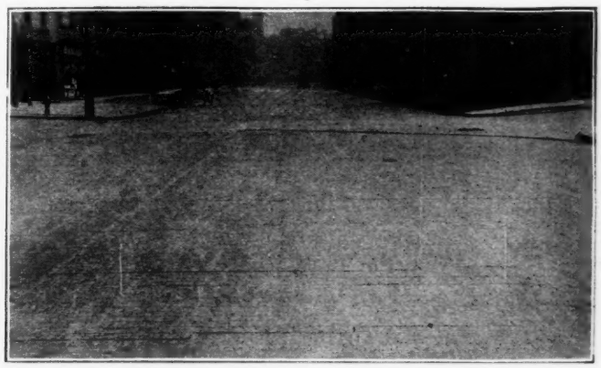


ADELBERT STREET, SOUTH OF EUCLID STREET.—1894

It is mainly on that account that the following notes, compiled during a recent visit to the city, are placed before the readers of the MUNICIPAL JOURNAL.

As in other cities, brick paving in Cleveland was originally laid on a sand cushion ,with a filler of the same material between the joints. This being found unsatisfactory in some respects, the use of tar as a filler was resorted to, with the result that, in hot weather, the tar gravitated to the gutters, the excess at the sides being balanced by a corresponding deficiency in the middle of the street. The seriousness of this condition becomes clear when it is remembered that, in a width of twenty-four feet between curbs, a rise of five-and-a-half inches is given the street surface; that is to say, with a brick five inches deep the bottom of the brick can be entirely drained of the fluid jointing material.

FERN STREET, BETWEEN EUCLID AVENUE AND PROSPECT STREET.—1892



WOOD STREET, AT HAMILTON STREET.—1894

The next stage, at which the jointing problem has rested for some years, was to fill the joints with a grouting of Portland cement mortar, mixed one to one with sand. When carefully carried out, as is certainly the case in Cleveland, this method possesses important advantages over both sand and tar filler. It ensures a permanent closing of the joints with a practically indestructible material, extending not merely to the foundation but also filling the widened top space due to the necessary rounding of the arrises of the bricks. The consequent protection of the arrises is looked upon as an important requirement in a filler, and the fact that it is so admirably met by cement grouting is no doubt responsible for the favor with which that material is regarded. It has retained that favor in spite of certain disadvantages

SIXTH AVENUE, NEAR WILLSON AVENUE.—1894

inseparable from its use, the most salient being the excessively rigid character of any pavement thus laid. The usual method of meeting this is to insert a seven-eighths-inch board between the curb and the paving and to fill the space thus secured, after the completion of the paving and the removal of the board, with asphalt or other yielding material. This is analogous to the system, adopted in London and other English cities, of leaving a clay-filled strip at the sides of wood-block paving, the clay being gradually squeezed out by the expansion of the blocks. The object, in either case, is to allow of a slight degree of movement, set up by climatic fluctuations, and, in the case of cement filler, to obviate the cracks, and consequent access of water to the foundation, which have proved disastrous to many brick pavements.

As already indicated, cement filler still holds the field in Cleveland, but an experimental piece of pavement, under construction in Canton street during the writer's visit, is jointed throughout with a material known as the "Pioneer" asphalt filler, handled by the American Asphaltum & Rubber Co., of Chicago, Ill. This substance, as delivered in barrels on the work, is slightly lighter than water (specific gravity 0.99) melting at 215° F., and capable of being poured into fine joint spaces at 450° F. The piece of work now referred to was being executed by the Chicago company for the general paving work contractor, this arrangement being evidently best calculated to secure good results in an experimental length, but there is nothing in the material or process of melting and pouring which calls for more than ordinary skill. The results of this experiment will be closely watched by various interests, as its ultimate success may lead to important developments in this branch of municipal work.

A somewhat unusual feature of Cleveland brick paving is the general absence of a concrete foundation, this being possible with the favorable natural base usually found. This is puddled and rolled, an eight-ton water roller being used for the latter purpose, the full weight not being applied until the last stage of the operation. On the other hand, the bricks used are five inches, instead of four inches, in depth, a fact of some importance if the entire depth of joint is solidly packed with jointing material. As many as four successive pourings of cement grout are sometimes required to flush the joints even with the surface of the bricks. The latter are otherwise of the ordinary pattern, with projecting studs to ensure the requisite width of joint, and laying forty-one to the square yard. A rammer, having a face ten inches square and weighing eighty pounds, is used to bed the bricks upon the sand cushion, and special care is taken to mark and remove any bricks broken during this operation.

The four views accompanying these notes show streets in Cleveland, paved with brick blocks manufactured by the Metropolitan Paving Brick Company, of Canton, Ohio, the date when the work was done being given in each case.

THE FINANCIAL ASPECT OF THE METER SYSTEM

Mr. W. Dabney Hunter, Engineer and Superintendent of the Department of Public Works of Melrose, Mass., in his annual report, February 1, 1904 to January 31, 1905, considers the question of water waste and the general installation of water meters as a check to the large per capita consumption in that city. Out of the eighteen cities in the Metropolitan District, Melrose is second only to Boston in per capita water consumption, although the city's requirements are almost entirely domestic.

Mr. Hunter states that he had, a year previously, recommended that the adoption of water meters be postponed until such time as the assessment of the Commonwealth was based, not on the relative population, but on the relative consumption. This change has practically taken place, as chapter 426 of the Acts of 1904 provides that, in 1906, two-thirds of the assessment (the part heretofore levied on the relative population) will be assessed on the relative consumption, the assessment being based on the consumption of the year previous.

He believes that the change should greatly benefit Melrose, for the reason that its consumption is purely domestic, but under the present unrestricted water distribution the reverse will be true. He refers to a communication, dated December 8, 1904, to the Board of Aldermen, in which he showed that of every 100 gallons of water per capita per day consumed, about 78 per cent. was wasted, this being due principally to leakage in the street mains and house fixtures and to extravagant use. He then wrote, in part, as follows:

"This change in the method of assessment, as applied to our consumption of 1903, would increase our tax $2,863.51, and to save this amount by the adoption of meters would probably cost us four or five thousand dollars per year, and would therefore seem undesirable; but we must anticipate the action of the other cities and towns who will beyond doubt take all reasonable measures to reduce their consumption to the minimum, and if Melrose does nothing our tax will increase in proportion as the other cities and towns diminish theirs."

The estimate of the revenue required for 1906 is $54,302, which gives a mean daily consumption of 1,537,140 gallons and a gross annual consumption of 561 million gallons, or over 73 million cubic feet. Of the gross annual volume, Mr. Hunter estimates that the quantity actually consumed or that would pass through meters would be about 370 million gallons, and that this would be decreased nearly 50 per cent. by the adoption of meters, leaving 185 million gallons, or about 25 million cubic feet, actually paid for. This quantity, applied to the revenue needed, would make necessary a rate of twenty cents per 100 cubic feet, an increase of one-third over the present rate.

Mr. Hunter concludes his observations on this subject as follows: "If meters are adopted, and we reduce our waste to a minimum, the citizens can still use as much water, or more, as they now do without increasing the amount of our assessment, and in fact in all probability it would be reduced."

THE TOLEDO CONVENTION

Successful Gathering of The League of American Municipalities

FAVORED by weather conditions, excellent arrangements and, not least, by the hospitable reception extended by the City authorities and everyone even remotely concerned, the ninth annual convention of the League, held at Toledo, Ohio, August 23, 24 and 25, will be remembered as one of the most successful and enjoyable in the annals of that body. A registration of 350, hailing from seventy city and other areas, is in itself an evidence of the living interest displayed, and it is satisfactory to record that this interest was shown in the practical form of an intelligent participation in the discussion of the addresses and papers put down for consideration.

In welcoming the delegates to Toledo, the Mayor, Hon. Robert H. Finch, alluded to their wide geographical distribution and to their being in the city, not merely for a holiday, but to consider the serious and perplexing question of better municipal government—"perplexing because in our large cities are brought together the very extremes of society, the patriotic citizen and the public vulture, who secures valuable franchises and then hides behind law which he took good care to have prepared." Hon. William C. Crolius, Mayor of Joliet, Ill., President of the League, thanked the Mayor of Toledo for the cordial sentiments expressed and referred to the generous programme of entertainments provided by local effort for those who had responded to the city's invitation. He reminded those present that it was in the State of Ohio, at Columbus, that the League was founded in September, 1896, and appropriately referred to the League's present place of meeting as the home of a former Mayor, "Golden Rule" Jones—a man whose influence and personality had impressed themselves wherever he was known. After enumerating the objects of the League, President Crolius went on as follows:

"Our League is thus not an institution of reform in the sense that that term is generally understood. As a League we do not advocate municipal ownership of all public utilities or any other particular theory of municipal government, but confine ourselves to obtaining all information possible that may aid those officials who are charged with the duty of administering municipal affairs, and placing such information in their hands. We may advocate any particular municipal theories we wish as individuals but under no circumstances do we commit the League to such theories. * * * * There is still much left in our municipal affairs that needs our keenest attention. We still have our tenement districts, our reeking slums and our polluted alleys—places where the glorious orb of day never flashes his health-giving rays, and where a glimpse of the blue vault of heaven is never caught by their miserable denizens; no green hills or flowering valleys enchant their dim and sunken eyes.

Give all classes of citizens of our cities good air, good food, good pay for their labor and plenty of recreation, and an opportunity to come in contact with Nature herself in spacious parks with the fragrance and beauty of the shrubs and flowers to appeal to men, and you will have a citizenship in keeping with our boasted twentieth century civilization."

The annual report of the Secretary, Mr. John MacVicar, was then read, and after the discussion of routine business, the reading of papers was proceeded with, including "Fire Department Water Supplies," by Charles A. Hague, New York City, and "St. Louis Municipal Lighting Plant," by J. W. Wood, Chief Engineer, St. Louis, both of which appeared in the September number of the MUNICIPAL JOURNAL.

A two-hour electric car ride around the Perrysburg Belt Line formed an enjoyable interlude between the afternoon and evening sessions. The latter was partially taken up by a humorously presented exposition of the anomalies incidental to the system of real and personal valuation, by Peter Witt, City Clerk of Cleveland, Ohio, who illustrated his always amusing and sometimes caustic remarks by figures thrown upon a screen. Mr. R. P. King, C. E., Smoke Inspector, Indianapolis, presented a paper on "The Smoke Nuisance" (reproduced in this issue) in so far as the stereopticon illustrations were concerned.

The papers read and discussed in succeeding sessions included a statement by Judge Oscar Leser, of Baltimore, in regard to the steps consequent upon the great fire in that city. The optimistic views entertained by Mr. Leser, which are no more than a reflex of those on which the present policy of the city is being based, fully justify the congratulations which we were impelled to tender the city in our last issue; it is, indeed, scarcely too much to say that the present generation of Baltimoreans will see the day when what appeared to be, at the time, a disaster of crushing magnitude will be referred to as marking the date of their city's entry upon an era of unexampled prosperity and renown. "Street Cleaning," dealt with in practical fashion by Mayor Silas Cook, of East St. Louis, Ill., led to an interesting statement by Mr. G. H. Hanna, of Cleveland, on the lines indicated by his contribution to this issue of the MUNICIPAL JOURNAL, in regard to the street cleaning methods so successfully pursued in that Ohio city.

The paper on "Municipal Finance and Accounting," by Mr. L. G. Powers, Chief Statistician of the Census Bureau, Washington, published in our last issue, was discussed by Mr. Louis Betz, Comptroller, St. Paul, Minn., whose most recent contribution to the literature of this important subject—a paper read before the Winnipeg Convention of the

Union of Canadian Municipalities—is reproduced in our present issue. Mr. Wm. S. Crandall presented the arguments in support of the contention that disinfectants, so-called, are in danger of losing much of their real or nominal value by the absence of any standard according to which their germicidal value may be judged. Among the papers giving evidence of a long experience in the field sought to be covered must be mentioned that by Mr. Andrew Rosewater, City Engineer of Omaha, Neb., in which light was thrown upon the desirable features of asphalt pavement from the point of view of an engineer in charge of a municipal plant and engaged in gradually substituting this material for the pavements formerly in vogue in his city.

There can be no doubt that this was emphatically a Municipal Ownership Convention, every opportunity being taken advantage of to bring out the feelings of the delegates in favor of public control, directly exercised, of the various "utilities" forming parts of city organization, as opposed to a perpetuation of existing American conditions. An impressive address by Vice-Mayor Jones, of Columbus, at times rising to the pitch of eloquence, was received with almost vociferous approval by those whose good fortune it was to listen to this scathing indictment of the rapacity of corporations, and an equally earnest, if less demonstrative, welcome was accorded to the clear-cut exposition, by Mr. F. S. Spence, of Toronto, of the conditions governing the street car service of that city, which we are particularly glad to include amongst the contents of this month's Municipal Journal. But the culmination was reached when Mayor Dunne, of Chicago, rose to place the Convention in possession of the latest news from his bailiwick, felicitously described by the President as a suburb of Joliet, Ill. We follow in Mayor Dunne's footsteps, in this respect, by giving the added publicity of our pages to statements which received the undivided attention of his auditors and which are eminently calculated to dispel the misunderstanding—to use no harsher term—in which recent stages of his Chicago campaign have been enshrouded.

The election of officers for the coming year resulted as follows:

President—R. G. Rhett, Mayor of Charleston, S. C.

First Vice President—Henry Bohl, Member of Board of Review, Columbus.

Second Vice President—Joseph E. McCafferty, City Councilman of Wilmington, Del.

Third Vice President—George M. Hine, Mayor of Poughkeepsie, N. Y.

Fourth Vice President—F. S. Spence, Member of Board of Control, Toronto, Canada.

Secretary—John MacVicar, Des Moines, Iowa.

Treasurer—William D. Morgan, Georgetown, S. C.

Board of Trustees—Louis Betz, Comptroller of St. Paul; M. A. Browse, Mayor of Kokomo, Ind.; Silas Cook, Mayor of East St. Louis; Robert H. Finch, Mayor of Toledo; Hugo Grosser, Chief Statistician of Chicago; Harry F. Hooper, City Registrar of Baltimore; Otto Rhinehart, Detroit, Mich.

With the selection of Chicago as the meeting place for 1906, the more solid proceedings of the 1905 Convention came to an end. They had been enlivened by episodes ranging "from grave to gay, from lively to severe," and the business cares of those more particularly charged with the responsibilities of the occasion had been lightened by hospitalities and attentions not universally forthcoming. In this connection a word of recognition is due to the local Street Railway Company, and to all the telegraph and telephone interests represented in the city, for courtesies involving the free use of their respective services during the sojourn of the delegates in a city from which they carried most agreeable recollections and in which, we are equally certain, they left the kindliest wishes for its welfare.

A PRESIDENTIAL ADDRESS

The following address was delivered by Mr. A. Prescott Folwell of Easton, Pa., as the retiring President of the American Society of Public Improvements, at the Convention held in Montreal last month and elsewhere reported in this issue:

Eleven years ago today, less two weeks, this society was organized in Buffalo with sixty members. In three years this number had greatly increased, and the society was recognized as an influential body of workers for municipal progress. Its good work has continued, and the Society has maintained a high reputation for earnest endeavor which it is to be hoped it will continue to deserve. Of the size of its membership, however, the record is less favorable. While the good accomplished by a society is by no means to be gauged by its size, yet its influence cannot be as well maintained or as wide-spread, nor will its standing be as generally recognized, if its numbers diminish too seriously. During the second three-year period of its history the number of members had decreased practically one-half, and in the four succeeding years remained practically stationary, making a net gain of but eleven during that time. To many of our members this failure to increase in size seemed ominous—a halting in uncertainty between a lapse into oblivion on the one hand and, on the other, a great increase in size and influence. With the hope of directing it toward the latter they have made a special effort this year to increase the membership, and have so well succeeded that we have in one year more than recovered our lost ground, and our membership is now larger than ever before. Thus encouraged, it is hoped that the work will not only be continued by those who have already done such good service for the Society, but that it will be taken up by *all* the members and that our numbers may be

increased by at least fifty per cent. annually until every municipality of the country is represented. If there is a place for this Society which no other fills, if there is work for this Society to do which is not within the province of any other society, then it is our duty to make our utmost endeavor to extend its power for good into every municipality of the land. But if there is no good and logical reason for its existence, if the work we are attempting to perform is of no value or is a mere duplication of that which is being better done by others, then our efforts are being wasted and the sooner we appreciate this and disband, and direct them into other channels, the better for us as individuals and for the cause of municipal betterment. If there *is* a certain area in the field of municipal advancement which is peculiarly our own—and I believe there is—then our best work will result from a study of its nature and confining our energies within its boundaries.

As stated by our constitution, the object of this Society is "to disseminate information and experience upon, and to promote the best methods to be employed in, the management of municipal departments and in the construction of municipal works." The National Municipal League is largely composed of citizens as such only, who consider "political, administrative and educational phases of the municipal problem." In the League of American Municipalities are gathered the mayors and other officials of our cities to study "all questions pertaining to municipal administration." The purpose of the American Civic Association is "the cultivation of higher ideals of civic life and beauty in America."

The first two consider chiefly municipal administration as a whole, and the methods of co-ordinating various municipal departments, but to only a slight extent the details of the management of individual departments, while this last would seem to be explicitly stated as one of the objects of this Society and one worthy of our earnest consideration.

At first thought it might seem that the field of engineering was already more than covered by existing societies. An examination of the work done by these, however, will show that this is not the case. The American Society of Civil Engineers and its Canadian sister, since they cover the entire field of engineering, pay very little attention to municipal engineering, as an inspection of their Proceedings will show. The various State and sectional societies do somewhat more along this line, but the amount is still relatively small and there is a tendency to continuance in local ruts. The municipal engineers of Greater New York have recently formed a Society which has a most promising future, but its membership is limited to that corporation. There is a place, therefore, for a society which will do for all the other and smaller cities of the country what this last Society does for New York; and many of the members even of that Society have joined with us for mutual benefit along the line of municipal engineering. One branch of this, however—water supply—is well served by several societies, notably the American Water-Works Association and the New England Water-Works Association. But street paving, cleaning and general maintenance, refuse collection and disposal, sewerage and sanitation (except as the latter is treated from the physician's point of view by the American Public Health Association) and many other avenues for municipal improvement await the assistance of this Society in their development.

It might seem that the above considerations left for us only details of administration and construction, but such is far from being the case. We may consider as experts the broad subject of the relative values of various utilities to a modern city, which are essential and which non-essential to its most profitable growth. We shall be doing a better work in persuading a city to adopt proper sanitary garbage disposal than in designing the details of its plant. To demonstrate and convince of the sanitary superiority and greater economy of a sewerage system over cesspools is as important as to build the system. But perhaps most important of all is it that we should offer opportunities, to those civic officials who find them in no other society, for that personal contact between those having similar aims and life purposes which gives them encouragement and inspirations of renewed vitality in their too often unappreciated and discouraged efforts for the betterment of their respective cities. To a certain extent it is a weakness, but to a much greater should it be a strength, that our membership is not composed of one class only of officials, but that mayor, alderman, engineer and street and other superintendent all meet here to exchange ideas and learn each other's point of view and our discussions should be, and to a large extent are, demonstrations of the value of this.

Five years ago provision was made for admitting to the Society associate-members, who should be interested in municipal supplies from a business point of view. Nothing further seems to have been done in the matter, however, until this year; which was unfortunate, as it is our duty to our several municipalities to know the latest and best in materials as well as in methods. The Exhibition which is this year presented for our inspection is the first fruits of an endeavor to acquire associate-members and make use of them for our good—and we hope for theirs also. There are undoubtedly many ways in which this Exhibition could be improved. It is hoped, however, that the idea will be generally recognized as so beneficial to all that our associate members will decide to organize and arrange among themselves for a more complete and satisfactory exhibit next year than this first one can hope to be.

In retiring from the Presidency of the Society I desire to thank you for the most cordial and untiring support which so many of you have given me in my efforts for its good, and to congratulate you most optimistically upon the outlook. If so much can be accomplished by so few in one year what is not possible for the future, with an increased and increasing number of workers? But continuous and long continued effort is required; continuous, that the delayed benefits of one year's work may not be lost through failure the next year to exert the lesser effort required to gather them in. It is my hope that I may have the honor to be Past President of a Society vastly larger and more influential than that whose Presidency I am now about to resign to another, but whose interests I shall not therefore have the less at heart.

THE MONTREAL CONVENTION

The American Society of Municipal Improvements Beyond the Canadian Line

As noted last month, this year's Convention of the American Society of Municipal Improvements, held at Montreal, September 5-7, possessed the special characteristic of being held on what it is becoming increasingly difficult to regard as foreign soil, the relations between the United States and Canada partaking in a large degree of that cordiality fortunately subsisting between the Republic and the Motherland. The gathering was exceptional in another sense, the members coming together at a time when, thanks to the efforts put forth by the Council and others, the roll contains more names than at any previous time. The circumstances through which this gratifying result has been attained are set forth in President Folwell's address and commented upon elsewhere. It remains now to add that the gathering was such as to justify the selection of a city somewhat beyond the routine of choice in these affairs, and to afford ground for confidently looking forward to conditions still more satisfactory at future conventions, when the difficulties of arranging for the auxiliary attraction of an Exhibition have been smoothed away by experience.

On the present occasion, the laudable endeavor to hold the Convention and the Exhibition under a single roof led to conditions calling to mind that "vaulting ambition which oe'r-leaps itself and falls on the other side," for the Crystal Rink found critics among both classes of visitors. Nothing could have been more acceptable, however, than the reception given the invading host by the City and individuals alike, a special meed of appreciation being called for by the labors of Mr. Alcide Chausse, Chairman of the Finance Committee, who did yeoman service, both before and during the Convention, in providing for the comfort, information and guidance of delegates and guests.

Owing to the changes in arrangements consequent upon partially abandoning the Rink as a location for meetings and discussions, any detailed account of these is impossible at this moment. But the papers laid before the Convention included a study of "The Legislative Functions of Greater New York," the bulk of which is now presented to our readers, and, similarly, a paper by Mr. F. W. Fitzpatrick, on building construction, will attract attention. A sentiment to which expression is being frequently given, in connection with conventions in general, found adequate vent at Montreal, where the advantages of printing the papers, or at any rate a full synopsis of them, in advance would have been warmly appreciated by many desirous of intelligently and profitably participating in the discussions.

Marked atention was given to an essay, by Hon. R. S. Weir, Recorder of Montreal, nominally treating of "Montreal, Past and Present," but so framed as to form an inviting recapitulation of the essentials of an ideal city. The origin and development of villages, and the prospects of their ultimate absorption by the commanding position and authority of a larger neighbor, were touched upon with an evident reference to local conditions. The Author concluded with the admonition that while it was well to secure the material progress and comfort of the city, it should be remembered that the ideal city was one that made its effective appeal to the sentiment, imagination and patriotism of citizens. It was a great thing that Oxford, with its dreaming spires, could so arouse the affection of a poet like Matthew Arnold, and Athens move to its noblest eloquence the speech of Lord Macaulay. It was because he considered the Society a body of practical idealists that he wished those present God-speed in their work of municipal amelioration.

A paper by Mr. B. E. Briggs, City Engineer of Erie, Pa., discussed the cost of garbage collection and disposal and incidentally gave data, quoted from a report of the American Public Health Association, as to the methods prevailing in a number of American cities. In forty-four of these garbage is dumped on land and in eighteen others ploughed in or used as fertilizer; nine cities burn their refuse and fourteen dump it in water, while reduction processes are in use in nineteen instances. In line with this discussion was a paper by Mr. Howard G. Boyles, C. E., of New York City, who expressed a decided preference for incineration as opposed to the attempt to realize the nominally valuable constituents of city waste by the various reduction processes; he felt that to discuss the latter system at any length would be to waste the time of his audience. His criticism of the works in Cleveland, Ohio, was especially emphatic.

Other contributions to the proceedings were Mr. John N. McClintock's essay on "Municipal Parks," in which he took occasion by the hand in order to arraign the discharge of sewage into Boston Harbor; Mr. Frederick G. Todd's lantern lecture on "Character in Park Design," a similar display, by Mr. Harry Bragg, dealing with the locations and attractions of Canadian cities. The use of oil on macadam pavements was the subject of a paper by Mr. Theo. F. White, of Los Angeles, Cal., the discussion of which showed a diversity of opinions as to the practicability of generally adopting Californian practice in this respect.

Some interesting statements were elicited by the discussion of reports presented by various committees of the Society. Thus, Mr. H. W. Wilmot, of New York City, following the presentation of a report by the Committee on Municipal Data and Statistics, said that some cities did not know how to keep a cash book and that others got along without balance sheets. In connection with the report of the Committee on Municipal Franchises, Mr. J. R. Barlow, City Surveyor of Montreal, pointed out that in the early days of municipal improvement cities were perhaps only too willing to grant permission to lay pipes and similar works, but since then private corporations had gone to the various legisla-

tures and acquired privileges practically giving over the streets to them. Mr. James Owen, of Newark, N. J., summed up the conclusions of the Committee as recommending that all concessions to use public highways, in any form, should be in the nature of permits, revocable at will or at definite periods, and that no legislation should be passed which usurped the complete ownership of the public in any public property.

Among the closing business of the Convention were the selection of Birmingham, Ala., as the location of the 1906 Convention, and the election of officers, resulting as follows: President, C. C. Brown, Indianapolis, Ind.; 1st Vice-President, John R. Barlow, Montreal; 2nd Vice-President, Jas. Owen, Montclair, N. J.; 3rd Vice-President, Julian Kendrick, Birmingham, Ala.; Secretary, Geo. W. Tillson, Brooklyn; Treasurer, F. J. O'Brien, Oswego, N. Y.

Among the entertainments provided as features of the Convention, prominence should be given to the delightful carriage drive through the principal streets and squares of the city, concluding with a tent luncheon near the top of Mount Royal, at which the toasts of King Edward and President Roosevelt were honored with equal enthusiasm. A visit to the immense Engine and Car Works of the Canadian Pacific Railway, in a special train placed at the disposal of the visitors by the Company, was greatly enjoyed by the large number, including ladies, who had kept this trip in view from the beginning. Car riding in the City and suburbs was free during the week, by the courtesy of the Street Railway Company, and in this and many other ways there was an evident desire, from Mayor Laporte downward, to render the sojourn in Canada's commercial metropolis an enjoyable and profitable experience.

NEW ENGLAND WATER-WORKS ASSOCIATION CONVENTION

An innovation, the signal success of which may lead to its more or less frequent repetition, was introduced into this year's Convention of the New England Water Works Association by holding it beyond the confines dictated by the name of a body which has done much entitling it to recognition in a wide field. In selecting New York City as the Mecca for September 13-16, the Executive doubtless had in view a record attendance, which is believed to have been easily assured, the topical allusion of a Hippodrome performer to "six hundred members" being within the mark.

A very full programme included papers on "Fire Service Meters," by Mr. E. V. French, C. E., Boston; "Water-Works Accounting," by Mr. John E. J. Mullhall, of Boston; "The Water Softening Plant at Oberlin, O.," by Mr. W. B. Gerrish, of Oberlin, and "The Relation of Typhoid Fever to Character of Water Carriage," by Prof. W. R. Mason, of Troy, N. Y. The reports of Committees on Meter Rates, presented by Mr. Freeman C. Coffin, C. E., of Boston, led to an interesting discussion, in which the advocates of "flat rates" had to contend against objections urged by those who saw the justice of some discrimination. The report discusses the "frontage" and other assessment methods now in vogue, and disclaims any attempt to fix a scale of prices, as no such scale would meet with general adoption. The need for a more rational and uniform basis of assessment is emphasized by the persistent disinclination to adopt the meter system, the alternative of providing, "at much larger cost, a new supply or additional piping or pumps" still being clung to. The Committee believes, however, that "as further experience shows that the use of meters is certain to reduce a large per capita consumption of water, and furnishes absolute data from which to estimate what it will do in this respect, this obstacle to their adoption will disappear. The matter of standardizing hose and hydrant threads came up as the subject of another Committee report, the advisability of this step being indorsed. A paper read at the March meeting of the Association, by Mr. William E. Sullivan, C. E., of Lowell, on "Tests of large Meters and Fire Supply Devices," was discussed at the Convention, and a Committee report on "Private Fire Services" was also reviewed.

The feature of the Convention was the symposium on the relation of copper sulphate to water supply, in which an array of authorities expressed their views in regard to the much debated treatment of impure or suspected waters by the addition of this poisonous substance. The subject was discussed in all its bearings, including the application of the copper to filters and reservoirs, Dr. George T. Moore, of Washington, taking a leading part. The report is expected to be among the most important of any appearing in the Association's Journal in some years.

The water supply of New York provided a fertile theme for addresses and stereopticon illustrations, of which the most comprehensive was that delivered by Mr. G. C. Whipple, C. E., of New York. These led up to the principal excursion of the Convention, members and guests making an early start, on the last day, from Grand Central Station for the Croton Dam. Other visits included the Filter Plant and Pumping Station of the East Jersey Water Company at Little Falls, N. J., and various manufacturing establishments in and around the city were open to inspection. Boat trips on the Hudson and East rivers, and to Coney Island, served to familiarize the many strangers with some of the principal features of the city and its surroundings. Even the Subway was scheduled as among the attractions not to be lightly passed over—or through. The headquarters of the Convention were at the Murray Hill Hotel, the accommodations of which lent themselves admirably to the meetings and the Exhibition held in connection therewith. We refer in detail to the latter feature on another page, and need only say here that the exhibits brought together formed an excellent object lesson in many principal and subsidiary lines of modern water-works practice.

The President, Mr. George Bowers, of Lowell, Mass., is to be congratulated on his year of office coinciding with a Convention of this successful character. The arrangements were in charge of a special Committee, consisting of Messrs. J. Waldo Smith, Robert J. Thomas and Allen Hazen, with Mr. Willard Kent, the veteran Secretary, as advisory and executive official, qualified by a lengthy experience of the Association's work.

LITERATURE ON MUNICIPAL TOPICS*

What the Magazines and Reviews Have to Say About Civic Affairs—Municipal Reports Received

Articles in American Periodicals

Mechanical Filter of the Brooklyn, N. Y., Water-Works, (illustrated), *The Engineering Record,* August 26, New York.

Hydro-electric Plant of the City of Bruck, Austria, (illustrated), by Franz Koester, the *Electrical Review,* September 2, New York.

Sewage Disposal in Ohio, Wisconsin and Illinois; Ozone for Water Purification, The Engineering Record, September 2, New York.

The Scioto River Storage Dam at Columbus, O. (illustrated), by John H. Gregory, *The Engineeering Record,* September 9, New York.

The Electric Light and Power Plant of Brighton City, Utah (illustrated), by W. P. Hardesty, C. E., the *Engineering News,* September 7, New York.

Progress of Work on the New Water Supply System of Cincinnati, O., (illustrated); *The Handling of Material for Filling Grant Park, Chicago,* (illustrated), *Engineering News,* August 24, New York.

Difficulties of Construction of an Outlet Sewer; Port Washington Water-Works Under Air Pressure (illustrated); *Pressure in City Water-Works from Fire Protection View-Point, and Recent Municipal Work in Philadelphia, The Engineering Record,* August 19, New York.

Articles in Foreign Periodicals

Municipal Theatres Abroad (illustrated), *The Municipal Journal,* August 18, London, Eng. Price, 2 pence.

Problems in Practical Disinfection, by C. G. Moor, M. A., F. I. C., *The Sanitary Record,* August 17, London, Eng. Price, 3 pence.

Sewage Pumping and Destructor Works at Winchester (illustrated), *The Public Health Engineer,* August 26, London, Eng. Price 3 pence.

The Cleansing of Paris (illustrated), by William H. Ingram, B. A., *The Surveyor and Municipal and County Engineer,* August 18, London, Eng. Price, 3 pence.

Durban, (South Africa) Sewage Works (illustrated); *Proposed Main Avenues for London* (illustrated), *The Surveyor and Municipal and County Engineer,* August 25, London, Eng. Price, 3 pence.

Dublin's New Scheme of Refuse Disposal, a paper by Fred J. Allen, to be read before the Association of Cleansing Superintendents at Sheffield, Eng. *The Sanitary Record,* August 24, London, Eng. Price, 3 pence.

London Main Drainage, a paper contributed to the autumn conference of the Sanitary Inspectors Association, London, by Sir Alexander Binnie, C. E., formerly Chief Engineer to the London County Council, *The Public Health Engineer,* August 19, London, Eng. Price, 3 pence.

Kettering Water-Works, New Storage Reservoir, etc. (illustrated), by Thos. Reader Smith, A. M. I. C. E.; *The Kettering Combined Electricity Works and Refuse Destructor,* by F. J. Blakewell, A. M. I. C. E.; *Electric Light and Power Station and Refuse Destructor at Kettering,* by Thos. Reader Smith, *The Contract Journal and Specification Record* (and supplement), September 6, London, Eng. Price, 6½ pence.

Public Documents Received

Annual reports of Omaha, Neb., 1904.

Annual reports of Los Angeles, Cal., 1904.

Annual report of East Orange, N. J., 1904.

Municipal Register of Springfield, Mass., 1905.

Annual reports of the Ft. Wayne, Ind., city government, 1904.

Annual report of the Water Board of Baltimore, Md., 1904.

Annual report of the Fire Department of Los Angeles, Cal., 1904.

Ninth annual report of the Commissioner of Highways, Ontario, 1904.

Third biennial report of the North Carolina Board of Health, 1903-1904.

Biennial report of the State Board of Health of North Dakota, 1903-1904.

Annual reports of the Mayor and City officials of Birmingham, Ala., 1904.

Annual reports of Somerville, Mass., 1904. Hon. Leonard B. Chandler, mayor.

Fifth annual report of the Public Works Department of Melrose, Mass., 1904.

Second annual report of the Civil Service Department of Los Angeles, Cal., 1904.

Annual report of the Chief Engineer of the Fire Department of Paterson, N. J., 1905.

Annual report of the City Engineer and Water-Works Committee, Ottawa, Ont., 1904.

Seventh biennial report of the State Board of Health of Colorado, 1903-1904. C. E. Cooper, secretary.

Bulletin No. 3, State of Ohio Highway Department—Maintenance of Country Roads, by Sam Huston. August, 1905.

Bulletin Number One, Highway Department of the State of Ohio—Preliminary Instructions and Forms. Sam Huston. March, 1905.

Special reports of the Census Office—Street and Electric Railways, 1902; Department of Commerce and Labor, Washington, D. C.

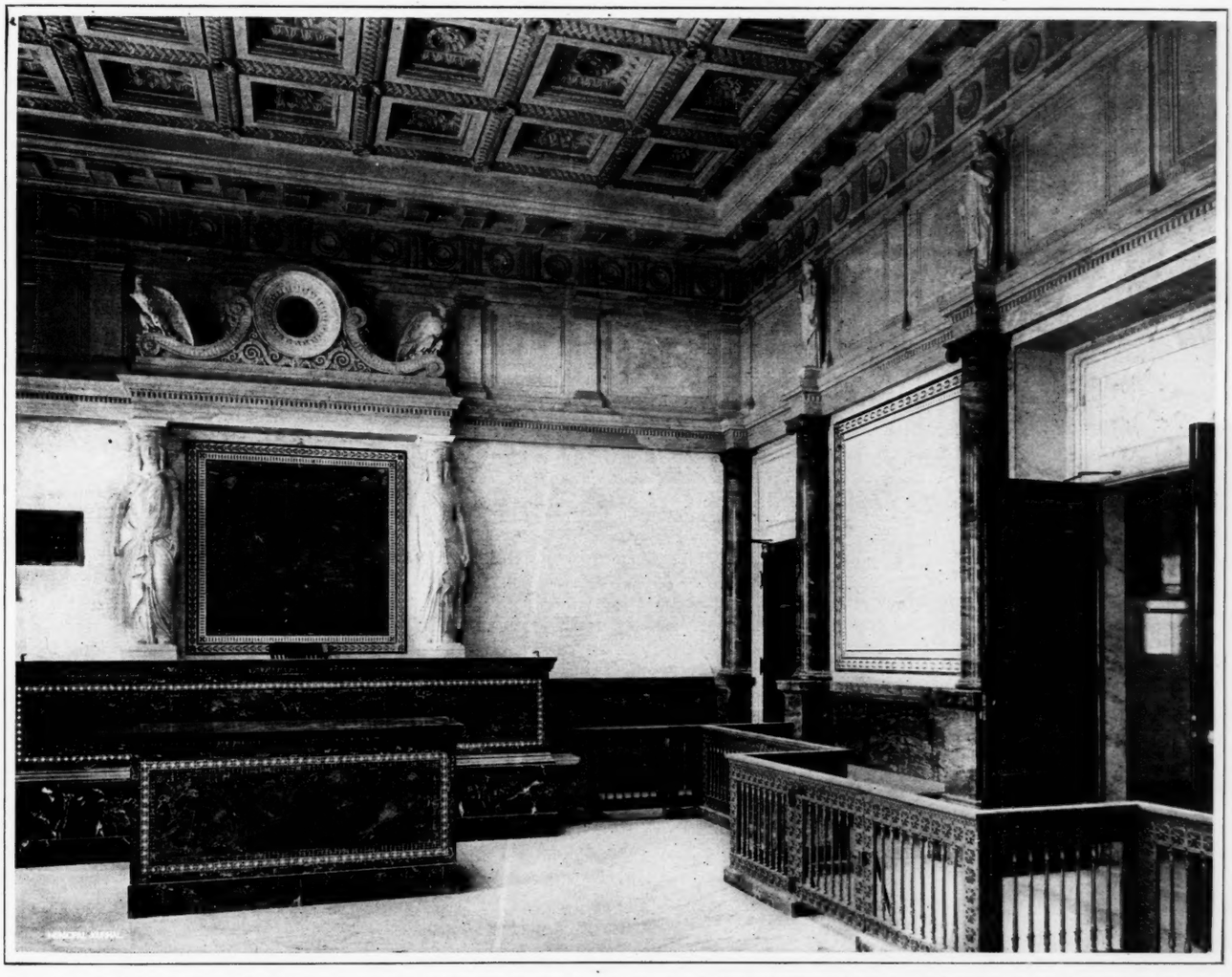
Manual with Rules and Orders for the Use of the General Assembly of the State of Rhode Island, 1905. Charles P. Bennett, Secretary of State.

* Any book or periodical reviewed or mentioned in The Municipal Journal, or elsewhere, will be sent to any address on receipt of price.

The New Federal Building, San Francisco

WHILE there are many structures, both public and private, which present a more imposing appearance than the new Federal Building now nearing completion in San Francisco, few can be found which have a more elegant interior. The exterior is granite, and most of the interior finish is marble from various countries. No expense has been spared to make this building as handsome and ornate as the skill of architect and artisan could accomplish.

The Library of Congress in Washington, it has been said, was the most beautifully finished and decorated public building in the United States. According to well informed architects and builders, that structure is not the equal of the San Francisco Postoffice and Federal Court House, which, even if it be excelled in some particulars by the Washington building, is said to average higher throughout.



FEDERAL BUILDING, SAN FRANCISCO.—U. S. APPELLATE COURT ROOM, A GEM IN BRONZE, MARBLE AND MAHOGANY. THE CEILING IS IN HIGHLY DECORATED PLASTER

Marbles, bronze, plaster decorative work and fine woods, chiefly mahogany, have been freely used. The outer doors are of bronze, highly embellished. The inner doors are either oak or mahogany, richly carved. The floors are of mosaic, tiling in designs, parquetry or marble. The ceiling of the main corridor is marble mosaic. The marbles include pavonazza, verde antique, old convent Sienna, red Numidian, and others from different quarters of the earth. The work of construction has lasted several years, but is now practically finished. Joseph W. Roberts was the Government Commissioner in charge of the work.

THE REMOVAL OF STREET MUD is about to be dealt with in a novel fashion in Dublin, Ireland, where the volume of sweepings amounts to 800 tons a day in the wet winter climate of that city. An area of fifty-seven acres has been reclaimed from the sea by the construction of a concrete wall, behind which it will be possible to dump 70,000 tons of mud per annum for the next twenty years and thus form the site of a future park. The difficulty of transport is to be solved by taking a supply of electric current from the local street railway company and using its tracks—under the right reserved by the city—for specially designed cars of watertight construction. It is estimated that, after making the most liberal allowance for capital outlay, depreciation, rents, operation, etc., the proposed system will enable the city to dispose of the mud at a cost not exceeding twenty-four cents per ton, being half the estimated cost of haulage by other means.

A Mayor's Advice

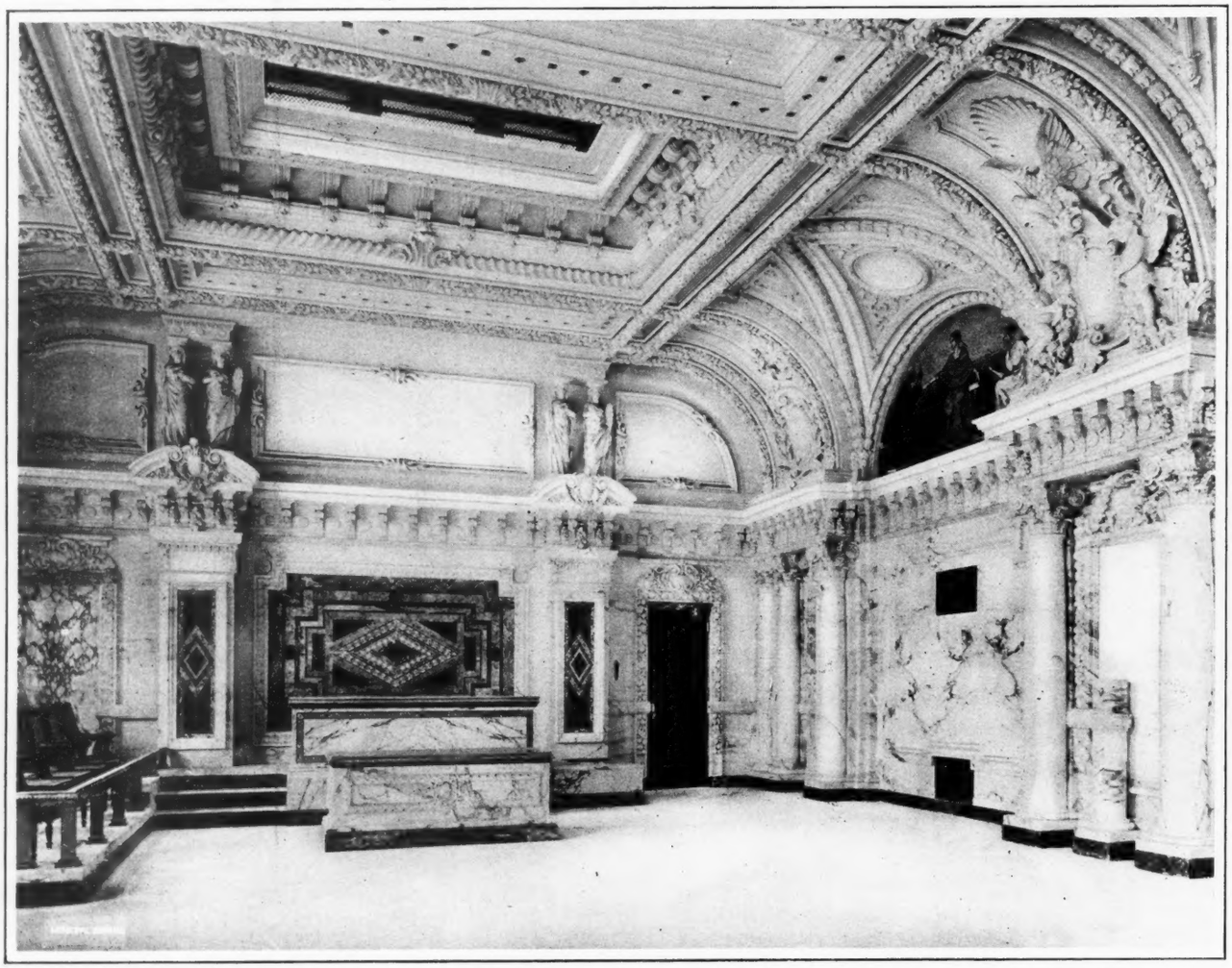
In a recent address, delivered before the League of Georgia Municipalities, Mayor T. W. Cochran of Barnesville, Ga., discussed the provision of sanitary works by the smaller cities and towns. He dwelt upon the necessity of approaching this subject in a comprehensive spirit, enforcing this by the statement that "to have good, pure water and eliminate sewerage you are laying the foundation for future trouble and sickness, contagious diseases and fevers." The following extracts from an address which secured the warm approval of those present are selected as representative of its entire scope:—

Without water-works, sewers, and electric lights, you will have a plain, common, fully grown old town, possibly a relic of the civil war, its old citizens forever crying, "keep out of debt," and never giving the young manhood a chance to show what might and can be done.

Give us a live, active city, with bonded debts, if necessary, and we can show you a municipality owning its school buildings, water-works, sewers, electric light plant, city hall and fire department.

Everything will be on the "hustle," for factory whistles will wake them early and keep them up late.

Keep working for betterments, and you will soon have all citizens with shoulder to wheel and pushing a good thing. Middle and North Georgia will know that this is the "Atlanta" spirit, and its pluck and push. If this spirit is unknown, leave home for a few weeks and investigate other towns of equal or larger size; something new will show itself and many lessons can be learned by the experience of others. . . . Have in view the first principles of a good heroic fireman, save life first and property next. Small towns should consider the health and lives of their citizens; first, by supplying good, pure water for all purposes and sufficient sewerage; second, the happiness, conveniences and pleasures, by having paved streets, drinking fountains and parks.



FEDERAL BUILDING, SAN FRANCISCO.—U. S. CIRCUIT COURT ROOM, SHOWING INLAID MARBLE WORK, PLASTER MODELING AND ONE OF THE MURAL PICTURES IN MOSAIC

Rivers Pollution in Pennsylvania is receiving the earnest attention of the State authorities, Health Commissioner Dixon being in communication with various municipalities regarded as lagging behind their obligations in this respect. Philadelphia is among the cities to which effective action in regard to sewage purification has been suggested, and it may be assumed that the recent acceptance of an important office under this State Department by Mr. F. H. Snow, of Boston, well known as a civil and sanitary engineer in connection with sewage disposal works at Brockton and elsewhere, portends unceasing activity on the lines now entered upon.

STREET CLEANING

By G. H. Hanna, Superintendent, Street Cleaning Department, Cleveland, Ohio

THE problem of street cleaning has been a very perplexing one with the larger municipalities of the United States and Canada. Various methods have been tried and thousands of dollars have been spent in experimenting, with the result that there are now a number of devices which can be used with great satisfaction. The subject must be looked at not only from the standpoint of cost, but also from that of the results attained.

In my opinion, the question of sanitation is of greatest importance, for the reason that the dust upon the streets is laden with death-breeding germs. It is far better to remove the dust thoroughly and thus prevent disease, even though it may slightly increase the cost of cleaning streets, and I believe that the taxpayers would rather pay for this additional service than be compelled to pay unnecessary doctors' bills.

For years merchants have suffered losses amounting to thousands of dollars annually by reason of the dust blowing into their stores and ruining their merchandise. This is almost equally true in residential sections, where housewives complain of the dust damaging house furnishings. There is but one way to eliminate these evils, and that is by a thorough system of flushing or wet cleaning. I believe that in the near future almost all the large cities will adopt this system for cleaning their streets. The introduction of this method of street cleaning in Cleveland has not only added to the beauty of the city but made it a healthful city to live in. Flushing not only removes all the dust but purifies and helps to cool the atmosphere—conditions which are greatly appreciated by the residents.

In June, 1903, the city purchased seven automatic wagons from the Sanitary Cleaning and Sprinkling Machine Company, of St. Louis, and we immediately began to reduce the number of our horse-power sweepers. This spring we purchased thirteen additional flushing wagons from the Cleveland Steam Boiler Works, of this city, making a total of twenty machines now in use. By working these in two shifts of eight hours each they are equivalent in service to forty machines.

The results obtained are most gratifying. They have exceeded our expectations, and I can conscientiously say that no city in the western hemisphere is as free from dust, or has more invigorating air than the city of Cleveland. Our health officer, Dr. Friedrich, the Academy of Medicine and the Chamber of Commerce Committee on Sanitation, who have thoroughly investigated the subject of street cleaning, are enthusiastic in their praise of the results accomplished and attribute at least part of the low death rate and the unusually healthful condition of the city to the system of flushing.

AIR-PRESSURE SPRINKLER, CLEVELAND, OHIO

We have at present three hundred miles of paved streets, of which 180 miles consist of brick, one hundred miles of block stone, and twenty miles of asphalt, and are adding from twenty-five to thirty miles of new pavement per year.

I have divided the city into five flushing, three sweeping and eleven pick-up districts. District No. 1 comprises the

down-town or business section, and is patrolled by sixty blockers or "white wings" by day and covered by six flushing wagons at night. In District No. 2 we use six flushing wagons, fifteen men and nine pick-up carts; also three sweepers on night-work. District No. 3 has six flushers working two shifts, as well as fifteen men and nine carts during the day. District No. 4 has two flushers working two shifts each, and three horse-power sweepers at night, also nine men and four carts during the day. District No. 5 has four flushers working two shifts each, three sweepers working nights, and fifteen men and nine carts on day-work. I also have sixty-five "white wings" distributed in the outlying districts at business corners where street car lines intersect and many people transfer. Five district foremen are employed for flushers and pick-ups and three district foremen for "white wings;" there are also two patrolmen to look after the violation of street ordinances where contractors are hauling dirt from basement excavations.

Our total expenditure for the year 1904 was $147,200, and this year will not exceed $190,000. This includes the maintenance of barns and the purchasing and repairing of all machinery and tools used by the department.

We aim to do our work unhampered by political pulls, and employ all men for their efficiency rather than on account of their political standing. In this we have had the coöperation of the Mayor, the Board of Public Service, and especially the Director of Public Works, W. J. Springborn.

In conclusion, I desire to say that in my opinion wet cleaning is by far the best method of cleaning paved streets, and that it can be more efficiently performed by the use of flushing wagons than by any other means known at this time.

MUNICIPAL ENTERPRISE IN LOS ANGELES

THE action of citizens of Los Angeles, Cal., in confirming, by an overwhelming poll, the action of the city authorities in bonding the land and water rights required, practically ensures an early start on the construction of the huge scheme of water supply noted on page 136 of the September number of the MUNICIPAL JOURNAL. As there stated, it is proposed to bring in a new supply by a conduit 240 miles in length, at an estimated cost of $23,000,000.

Having in view the large volume and head available, it is considered feasible to utilize these in connection with a municipal electric lighting project for public purposes. The City is now paying $81 per annum for each 2,000 candle-power lamp, or a total of $133,000 a year—a sum likely to be increased in the near future to 150,000, and, independently of the water scheme, the local Municipal League had approached the City Council, in June, urging the advisability of a municipal lighting plant, in preference to any extended renewal of the street lighting contract terminating in January next. The following extract from the League's statement to the Council will be of interest to many in virtue of the general information in regard to municipal lighting in the United States:—

Among the larger cities of the Union, the following now have municipal electric light plants: Chicago, Detroit, Columbus, Allegheny, St. Joseph, Grand Rapids and Nashville. Seattle is just installing a plant to cost $500,000. St. Louis has a plant to supply the light for the City Hall and City Courts buildings. Altogether there are 320 cities that do their own lighting out of a total of 964. A thorough investigation made by U. S. Commissioner of Labor, Carroll D. Wright, has shown that the cities owning their plants secure their electric light considerably cheaper than those relying upon private corporations.

Taking the seven cities named above, we find the cost of light, as compared with our charge of $81, to run as follows: Chicago, $75; Detroit, $61.25; Allegheny, $68.59; Columbus, $66; Grand Rapids, $61.65; St. Joseph, $72.12; Nashville, $54. If our lighting expense were reduced to the average of these cities it would mean an annual saving of about $30,000. The figures given above are obtained after charging in the interest and sinking fund, and in some cases also depreciation and loss of taxes. Furthermore, there is no city in the list that obtains fuel at a lower figure than is now obtainable in Los Angeles.

The experience of St. Louis is worthy of special note. Up to 1901, that city had been paying 13 cents per kilowatt-hour for its light for the City buildings. When the subject of building a municipal plant was agitated, the price was cut by the Company to 7½ cents. The sum of $35,000 was spent for the construction of a plant, which began operation July 31st, 1903. A recent report by City Engineer Wood shows that St. Louis is now getting its light for 2.06 cents per kilowatt. This includes 5 per cent. for depreciation of plant and 5 per cent. for interest. The plant will pay for itself in eighteen months as against the original price the city was paying for electricity, and hereafter save the city $25,000 a year. In this connection we may observe that Los Angeles is paying 13 cents per kilowatt-hour for lights in the various departments, and 3¾ cents for the Broadway lights.

The extent to which the movement for municipal electric lighting has spread all over the country may be best shown by the following figures, compiled from reports published of operations during the last three months, April, May and June, by the MUNICIPAL JOURNAL AND ENGINEER of New York: Cities getting bids for the construction of electric light plants, six; cities that have just issued bonds for this purpose, twenty-one; cities about to vote on bonds, twelve; cities that are having plans prepared, seventeen; cities that have the matter up for action in Council, twenty-eight; and to these lists might be added some two hundred American cities where the subject is under active consideration.

An Important Judicial Decision

THE principle of municipal ownership in this country has been given what may prove to be a serious blow by Judge Francis E. Baker of the United States Circuit court in a decision recently handed down by him to the effect that the contract between the Consumers' Gas Trust Company and the city of Indianapolis, giving the city an option to buy the gas property at an appraised valuation, was null and void. In denying the city's right, Judge Baker asserts that the company had no power to give the city an option.

A general law, passed many years ago by the General Assembly of Indiana, authorized the incorporation of companies to supply natural gas in the cities of the State through the public highways. The Consumers' Gas Trust Company was organized under this law in 1887 and obtained a franchise from the city of Indianapolis, one of the conditions of the contract being that the city might acquire the plant, at an appraised valuation, at any time after ten years. The city notified the directors of the Consumers' Company, in June, that it intended to exercise its right under the option, and the step was resisted by a stockholder who asked, through the Federal court, that the company and the city be restrained. The court found promptly for the plaintiff and against the city. The pith of the finding is contained in the following extract from Judge Baker's opinion:

WARREN'S BITULITHIC PAVEMENT, 20TH STREET, BIRMINGHAM, ALA.

"The character of a corporation of this character is the measure of its powers, and the enumeration of its powers implies the exclusion of all others. Such a corporation can exercise no authority which is not granted to it by the charter under which it exists, or from some other act of the Legislature which granted that charter. * * * The granting of a charter by the State to such a corporation is not simply a license to the corporation to engage merely as long as it chooses in serving the public. The company's acceptance of the privilege is a promise and an undertaking on its part that it will faithfully serve the public and will do nothing and suffer nothing to be done that will disable it from performing its duties during the term of its powers."

The city has filed a motion for an appeal, and Judge Baker has, since that action, handed down a modified opinion to replace the original finding. There is, in this, no change in the tendency of the judgment, but simply an effort on the part of the court to intrench itself more strongly. It reiterates the former conclusion that the gas company exceeded its corporate powers when it granted an option and that the option is consequently void; and it makes the additional point that the charter of Indianapolis, in force in 1887, gave the city no right to run a natural gas plant. On the general questions of municipal ownership, the modified judgment contains the following paragraph: "To what extent municipal ownership shall be carried is a political question to be answered by the political department of the State. Municipalities have only such powers as the State confers upon them. Their charters are given and are taken away by the Legislature. If cities have not the power they desire in the line of the ownership of public utilities, they cannot create them by ordinance and contract; they must go to the Legislature."

As might be expected, the ruling has created considerable interest in Chicago, and Mayor Dunne is quoted thereon as follows: "There may be some doubt over the question as to whether a private corporation empowered by the city or State to perform certain quasi-public functions has the right to commit suicide—in other words to go out of business—but it seems to me that any public corporation that accepts from the municipality a franchise hedged in with certain requirements and conditions is estopped from disputing any of the requirements. A company cannot reap the profits and then dispute the burdensome requirements. * * * No respectable court in the country will hold that a corporation can profit from advantageous provisions in a charter or franchise and then seek to dodge the burdensome ones. That is neither law, ethics, nor good sense."

It is not to be supposed, however, that this ruling will necessarily be accepted as governing the action of other municipalities and, as stated above, the particular city concerned has already filed notice of appeal from it.

The Exhibition at Montreal

FOR the first time in the history of the American Society of Municipal Improvements, an exhibition of manufactures connected with municipal engineering was held in connection with its annual Convention, at Montreal, noted on another page. Notwithstanding difficulties which presented themselves in the carrying out of this initial effort a representative collection of materials and appliances was brought together and effectively displayed in the Crystal Rink, the building in which the Convention Bureau was located.

Among those who took part in this division of the Convention may be noted the Montreal Pipe and Foundry Company, Ltd., of Three Rivers, P. Q., who showed specimens of their cast-iron pipes, hydrants, and other water-works supplies. The exhibit of the Sessions Foundry Company, of Bristol, Conn., was mainly confined to manhole covers and other sewer ironwork, while heavier machinery, more especially in pumps and high-head water wheels, was adequately represented by the John McDougall Caledonian Iron Works Co., Ltd., of Montreal, a firm engaged, among other work, in manufacturing Venturi meters for Canada.

The Metropolitan Paving Brick Company, of Canton, Ohio, had on view a selection of the products of its four factories, and the McEvoy Vitrified Brick Company was represented by shale bricks and other street materials. The special form of re-pressed vitrified brick blocks for use against T-rails in streets attracted considerable attention among visitors to the stand occupied by W. H. Arthur, of Stamford, Conn.

Water meters made an excellent showing on the respective stands of the Neptune Meter Company, of 120 Liberty street, New York City, and the Thomson Meter Company, of 79 Washington street, Brooklyn, N. Y. Closely allied to this branch of water-works supplies was the exhibit of the Canadian Fairbanks Company, manufacturers of sluice gates, hydrants and other specialties. Messrs. R. D. Wood & Co., Philadelphia, were represented by pipe castings and other water-works supplies.

An interesting section of the Exhibition was devoted to heavy wheeled machinery, among which may be specially mentioned the steam fire engine shown by the Waterous Engine Works Co., Ltd., of Brantford, Canada, which produces an extensive line of fire appliances, including a gasoline fire engine for small communities.

The Wilkinson Plough Company, of Toronto, was represented by dump wagons and road ploughs, the latter having been in use for many years in Canada and the Northern States.

Asphalt and its numerous combinations were well to the fore, an interesting contribution to this section being the asphalt block pavement made by the Ontario Asphalt Block Co., Ltd., of Windsor, Ont. Bitulithic pavement was in evidence at the stand of the Warren Brothers Company, of Boston, the exhibits showing the development of the raw material into the finished work, with actual cross-sections of the latter. The American Asphaltum and Rubber Company, of 721-3, Woman's Temple, Chicago, made a feature of its "Pioneer" filler for brick pavements. The Constructing and Paving Company of Ontario, Ltd., with head office at 105, McKinnon Building, Toronto, set forth the advantages of a concrete base with an asphalt surface as the preferred type of modern street pavement, and speaks with a large experience in this line of work. The Sicily Asphaltum Paving Co., Ltd., of Montreal, showed samples of the rock asphalt used especially for waterproof floors in basements and out-buildings.

Sewer construction was among the specialties illustrated by the Godson Contracting Company, of Toronto, whose line of work includes railroads, bridges and overhead structures generally. Pozite, a material having great possibilities in the jointing of sewer pipes in wet trenches, was exhibited by F. H. Pough, of 28 Burling Slip, New York City, who has the advantage of referring to effective work done in Mr. Alex. Potter's New Jersey joint sewerage work.

In the field of lighting, the Blair Light Company, of Northboro, Mass., was fortunate in the use of its "Automatic" gasolene lamps at the sides of the Convention platform, while the details of the lamp were explained by the inventor at his stand. The effectiveness of the light was the occasion of much favorable comment.

An unusually complete display of engineering instruments was made by the three firms, C. L. Berger & Sons, 37 William street, Boston, the Buff & Buff Manufacturing Company, Boston, and Kolesch & Co., 138 Fulton street, New York City.

Other exhibitors were the Canadian Fire Hose Co., of Montreal, making a specialty of an Underwriters' Fire Extinguisher; Jules Colas, Montreal, with an improved draining well; and the Goold, Shapeley & Miner Co., Ltd., of Brantford, Canada, handling the "Ideal" automatic concrete mixer; the Northern Electric Co., Ltd.; the Sawyer Electric Company; and the United States Wood Preserving Company, of 29 Broadway, New York City.

Hospital Ambulances

THE coupé front ambulance here illustrated is a design introduced by the Fulton & Walker Company, of Philadelphia, specially adapted to the use of municipal and private hospitals. Built with both side and rear doors, it is very easy of access and will be found to meet all requirements of this service. The Fulton & Walker Company has made a specialty of ambulance building for many years, and its business in this line is among the largest in the country, embracing every State and Territory in the Union.

A line of automobile ambulances has been added to the earlier horse-drawn vehicles, electric motors being used for propulsion in preference to any other motive power. The illustrated printed matter issued by the Fulton & Walker Company will be found of interest by those requiring ambulances, patrol wagons or business wagons of any description.

Pressure Sprinkling Machines

As an indication of the approval which street sprinkling and cleansing by pressure tanks is evoking, it may be of interest to quote, as follows, from a recent report to the Common Council of Detroit, Mich., by Mr. J. J. Haarer, commissioner of public works. He believed, as the result of experiments, that the permanent adoption of these machines would be desirable for the following reasons:—"First, they clean the streets better than any machine sweeper can, and without dust. Second, they drive the dirt and filth from the cracks and hollows in the pavements, so that in dry weather there is no fine dust to be blown about. Third, the expense of picking up after them is not so great as after sweepers, as a great deal of the dirt is washed directly into the sewers. Fourth, the total expense of cleaning has proved to be less than under any other system. Fifth, the unanimous verdict of all citizens and city officials who have seen the machines in operation is very greatly in favor of their adoption for cleaning our streets."

The Council voted to issue advertisements for four machines.

An Interesting Monthly

THE Advantages of Travel are well set forth in "The World's Progress" in the September number of "Four-Track News," the readable monthly which makes a specialty of locomotion. Among these, the writer emphasizes the pleasure and profit derivable from the companionships formed. The magazine is replete with information and suggestions for Americans who desire to make themselves acquainted with their own country or to expand their ideas by traveling beyond it. "Four-Track News" is published by George H. Daniels, 7 East 42nd street, New York City, and can be obtained at all news-stands on the New York Central Railroad system.

SCHERZER ROLLING LIFT BRIDGES

THE great value, economy and importance of transportation by water has never before been brought so forcibly to the attention of the manufacturer, the merchant, the warehouse man, the shipper and the real estate or property owner as at the present time of enormously expanding internal and foreign commerce. It is realized that the railroad systems, owing to their inherent restrictions and limitations, are far from adequate to meet the demands of all classes of transportation. Transport by water is and will necessarily continue to be the most economical mode of conveyance, as vessels can be constructed in all sizes to meet the requirements of the special interests to be served. Such large and varied units, moving virtually without friction upon water, are clearly impossible on land.

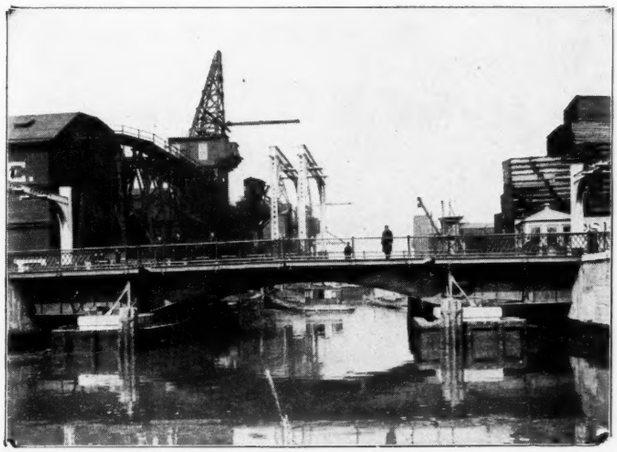


FIGURE 1. SCHERZER ROLLING LIFT BRIDGE AT UNION STREET, BROOKLYN, CLOSED

A vessel is not confined to a number of comparatively short routes, as is the case with the railroad, but has a practically unlimited number of routes at its service, provided by the great oceans of the world combined with the many bays, rivers, inlets and canals penetrating the interior. The rivers and canals are daily becoming of greater importance and value, as they form the connecting channels by which vessels can reach the commercial and industrial centers in the interior and enable vessels to obtain and distribute their cargoes without delay or expensive re-handling. These internal waterways are indispensable as great public highways. It is therefore essential, not only that they be improved, but that no artificial obstructions be placed in them which will impair, hamper or destroy their usefulness. This is true, even though at the present time the commerce taking advantage of them may not be large, as no one can predict what the demands of the future will be.

FIGURE 2. SCHERZER LIFT BRIDGE AT HAMILTON AVENUE, BROOKLYN, OPEN

FIGURE 3. SCHERZER ROLLING LIFT BRIDGE AT THIRD STREET, BROOKLYN, VIEW OF ROADWAY

The marvelous growth of Greater New York is principally due to its splendid natural facilities for water transportation, yet its growing commerce would rapidly halt and decline were it to delay or neglect in furnishing the most improved and modern facilities for the accommodation of its water-borne freight. Among these is that of removing all obstructive center-pier swing bridges from navigable channels and the substitution therefor of the most modern type of movable bridge, among which the Scherzer rolling lift bridge is a well-known type. The center-pin swing bridge has always been objectionable to navigation interests because it is supported by a large pier, combined with a long and wide protection pier, which occupy and obstruct the middle and best part of the waterway, frequently dividing the channel into two inadequate side channels where one efficient center channel is desired. This difficulty is overcome by the Scherzer rolling lift bridge, which is supported on piers placed at the sides of the channel and opens in a vertical instead of a lateral direction, leaving the channel free and unobstructed for the passage of vessels. It also has the advantage of moving more rapidly and of forming an effective bridge gate, guard and signal, these absolutely preventing accidents common to open swing bridges, while, owing to improvements and developments arising from its extensive use, it is more economical in cost of construction than a center-pier swing bridge of similar capacity. We illustrate in this issue three recent bridges of this type and manufacture, constructed to take the place of obstructive center-pier swing bridges across the Gowanus Canal, Brooklyn, N. Y.

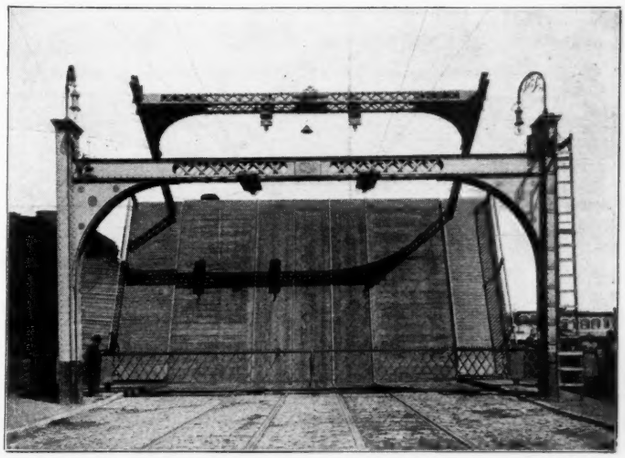


FIGURE 4. SCHERZER ROLLING LIFT BRIDGE AT UNION STREET, BROOKLYN. ROADWAY BLOCKED AGAINST ACCIDENT

The new bridges are respectively located at Hamilton avenue, Third street and Union street.

Figure 1 shows the new Scherzer rolling lift bridge at Union street in the closed position. It is a two-leaf deck structure; the bottom of the bridge being arched gives it a pleasing outline. This bridge carries a very heavy highway and electric car traffic. The water traffic on the canal is also very heavy, frequently requiring the bridge to be opened more than thirty times in a day. The bridge is operated by electrical power and is usually opened or closed in twenty seconds, one man controlling the movement of both leaves.

Fig. 2 shows the Hamilton avenue bridge in the open position. This bridge is located near the mouth of the canal and crosses the channel at an acute angle. The roadway is sufficiently elevated above the water to permit the passage of tugs and small barges without opening the bridge. Since the removal of the old center-pier swing bridges and the construction of the new bridges there has been a great improvement in the facilities for navigation on the Gowanus Canal; this has already resulted in an increase of industries seeking locations on the canal and a marked improvement in property values.

Figure 3 shows a view of the roadway of the new Scherzer rolling lift bridge at Third street, the bridge carrying the clear width of street across the canal and avoiding any obstructions above the surface.

Figure 4 shows a roadway view of the new Scherzer rolling lift bridge at Union street in the open position; it illustrates how effectively the roadway is blocked by the open bridge, thus guarding against accidents.

Other Scherzer rolling lift bridges are under construction, superseding and replacing center-pier swing bridges for Greater New York at Manhattan avenue across Newtown Creek Waterway, at Jackson avenue across Flushing Creek, and at Pelham Bay Park across Eastchester Bay. The center-pier swing bridge at Manhattan avenue across Newtown Creek Waterway was extremely obstructive to navigation, vessels being frequently delayed half-an-hour or more in passing through the narrow side channels, while large ocean-going vessels were blocked from going through the draw. The new Scherzer rolling lift bridge which is rapidly nearing completion will entirely remedy this condition, as it provides a clear channel for navigation 150 feet wide between the protection fenders, sufficient to enable the largest ocean-going vessels to pass the bridge easily and rapidly. The very extensive manufacturing and other interests located along Newtown Creek Waterway are already realizing the benefits accruing from this important improvement, and the work of removing the remaining center-pier swing bridges will be undertaken as rapidly as possible.

Navigation, transportation and property interests would be greatly served were this modern type of bridge adopted on the Harlem River in place of the obstructive center-pier swing bridges which now block the middle and best part of this important waterway. The center-pier swing bridge has outlived its usefulness and it has always been impossible to make it artistic or beautiful. On the other hand, the Scherzer type of bridge has the classical outlines of the arch and can be built as a clear deck structure. Its possibility for artistic ornamentation is shown by the illustration herewith presented (Figure 5) of a boulevard bridge similar in outline to the famous Alexander III. bridge at Paris.

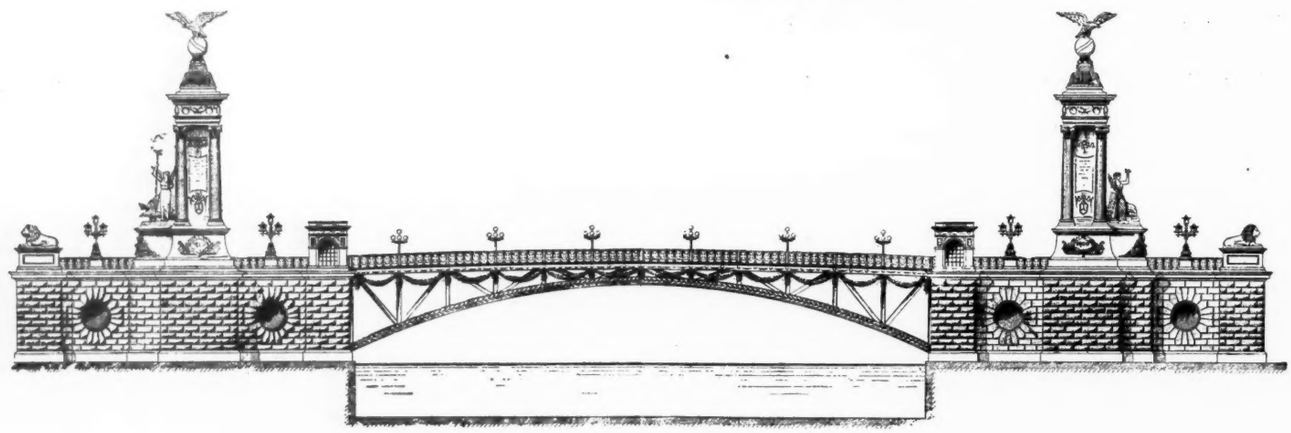


FIGURE 5. BOULEVARD SCHERZER ROLLING LIFT BRIDGE

Paving Brick Catalogue

The Metropolitan Paving Brick Company, of Canton, Ohio, is issuing a new catalogue on which a large share of time and effort, to say nothing of the money cost involved, has been expended, with the result that much more than a mere enumeration and description of the Company's products has been achieved. From the historical data contained within its covers we cull the statement that the first brick pavement in the United States is believed to have been laid in Charleston, W. Va., in 1870, although brick had been applied to that purpose in Holland in the seventeenth century.

As regards the Metropolitan Company's share in the development of this important industry, it is shown that the Company's plant has cost over a million of dollars and that an equivalent amount is the lowest estimate that can be placed on the "know how" without which even all the invested capital of this large concern would be of relatively small value as a commercial asset. The Company has furnished enough paving material to about two hundred cities to build a national driveway twenty-five feet wide from Chicago to New York, and its present rate of output would girdle the earth with a line of paving brick four to five inches deep and three and one-half inches wide in two years. An important factor in the favor with which the Company's product is regarded is the location of the plant on an extensive deposit of shale, possessing all the qualities essential to the manufacture of a high-grade paving brick. This, however, does not supplant the necessity for constant care and skill in the manipulation of the material from the time of its excavation as raw material until its emergence as a perfect constructional product; in fact, some of the most entertaining pages of the catalogue refer to the various processes to which the shale is subjected before reaching the presses and kilns.

The illustrations are a notable feature of a catalogue which is sure to be sought after by all who have to do with street paving on lines recognized in modern practice.

Paving by Injunction

WHEN the bitulithic pavement was introduced, nearly five years ago, attracting widespread attention among engineers and road-builders all over the country, the asphalt interests were strongly entrenched. They had enjoyed a monopoly of smooth pavements, and their success in wiping out opposition had made them arrogant. In the bitulithic pavement they felt they had a weakling which could be driven from the field by ridicule. The bitulithic method of construction was condemned and anonymous bulletins of criticism were sent broadcast over the country in the evident belief that their opponent would be swept from the field.

The inventors apparently knew the value of their product and were confident that, when engineers had given their theory study, the correctness of the principles involved would be quickly recognized and appreciated. They felt, therefore, that any attacks by the asphalt interests might be ignored. Nor were the bitulithic people wrong in their premise. The more their theory was attacked the more interested became the city officials who were being flooded with the anonymous bulletins. What had been designed as a "knock-out" blow for bitulithic proved to have brought it more prominently before the people, and the shrewd public realized that it must possess qualities or merits sufficient to alarm the Trust, and that it would have been left to die a natural death had it been a worthless invention. The Trust's next attack was in the form of distorted and "doctored" photographs of alleged defects in the bitulithic pavement. Everything that imagination could conceive was brought to bear to discredit the bitulithic pavement. Its inventors pursued the even tenor of their way and paid little attention to the attacks of the opposition. Their rapidly increasing business probably kept them too busily occupied to be annoyed, and the gratuitous advertising received was possibly a balm sufficient for any wounded feeling.

Chagrined at the futility of its attacks, the Trust adopted "dog-in-the-manger" tactics. If it could not secure its object in any other way, it concluded to attack the people and prevent them, by injunction, from obtaining what they desired and were willing to pay for. This plan, like all the preceding ones, has thus far failed, but the Trust has aroused the Press by its insolent interference. It has induced private citizens to institute proceedings, and the Court records of London, Ont., show that one of its instruments was too honest for the work allotted to him, testifying in open court that the proceedings brought in his name were inspired and the costs of the Court paid for by the asphalt interests. The few newspaper extracts which follow will disclose the length to which a business rival will go in its unfair competition.

Editorial from the Indianapolis, Ind., "Sun," August 31, 1905: "The Board of Public Works took the proper course when it refused to interfere in the progress of the paving work in North-western avenue. It should have taken similar action long ago. It should, to use a homely but popular expression, have told the "asphalt barons" "where to get off" at the very beginning.

"Never were the property owners more shamefully treated than have been those on North-western avenue. Because they selected a pavement not to the liking of the asphalt barons the latter have tied them up in the courts in such a way as to leave North-western avenue in an almost impassible condition. A more brazen and arrogant interference in the affairs of property owners was never before attempted, and the pity of it is that the city authorities permitted it without protest.

"Of course, the object of the asphalt gang is to prevent a new and substantial pavement to enter the field as a competitor for place. It seeks to tell the property owners that they shall not have what they want—that they cannot spend their money as they wish. But the bitulithic pavement will come into this field. It has proved to be an excellent and long-wearing pavement, and the people will have it.

"The asphalters can appeal to the law and the prophets if they desire, but they will be beaten in the end. Their conduct will be remembered and it is quite certain that they will receive very little consideration from the Indianapolis public in the future. The same can be said of the block men, who have been none the less despicable than the asphalters. Together, these fellows have assumed altogether too much and have carried their arrogance a bit too far. They will receive their deserts in the near future."

Editorial from "The Milwaukee Journal" of September 6, 1905:

"TRUST INSOLENCE.—The presence in this city of the representatives of the Asphalt Trust in an effort to restrict the city from following her own course in the letting of contracts to the bitulithic company is the veriest kind of insolence. The thought that this of all outside parties should presume to dictate to the people of Milwaukee is enough to make the blood of self-respecting citizens boil with rage.

"The Asphalt Trust has abused the city at every opportunity given it. No pavement seems to have been too bad to satisfy in the minds of the Trust their contracts with the city. And now, after having levied on Milwaukee until the city rebelled, the same Trust comes forward to tell the city she must continue to pay tribute to a self-appointed master. If Milwaukee has not learned her lesson it is full time she does so. Further tolerance of the Asphalt Trust must cease. Its representatives in the city would be none too poorly treated were they tied in a wagon and driven rapidly over the streets which they claim to have paved. The ordeal might shake into their blighted consciences some appreciation of the limits of propriety and destroy the attitude of arrogance and insolence with which they view Milwaukee."

The Asphalt Company failed in Milwaukee in its court proceedings, and within fifteen minutes after the Judge's decision the contract was signed and within one hour the Central Bitulithic Company had a force of men at work on Wisconsin street.

Charles E. L. Pratt and Robert McIntyre, of London, Ont., brought action as property owners seeking to enjoin the contract in the city for the bitulithic pavement. At the hearing of their petition both Pratt and McIntyre testified that at the instigation of the Barber people they had brought the suit and that the asphalt people had agreed to indemnify them against the costs. Justice Teetzel, before whom the case was tried, denied the motion for an injunction.

Commenting on this case, the "London Advertiser" of July 28, 1905, said: "In his judgment Mr. Justice Teetzel says that there is a possibility of the transaction being tainted with champerty. There may have been at the bottom of it all a bargain made by some person not interested in the suit, by which the non-interested party was to supply the sinews of war and eventually profit by the suit. This is an offense against the law and is punishable."

In Portland, Ore., where the property owners petitioned for the bitulithic pavement to the exclusion of all others, the asphalt people raised a cry of favoritism and, bidding under the specifications, asserted that they could lay a pavement under any other name than bitulithic, or without a name, that would be equal to it in every particular, although up to the present time attempts at imitation have proved abortive. Their bid was referred to the City Solicitor who, in a written opinion to the Executive Board, stated that as the petitioners had prayed for the bitulithic pavement that alone should be given them by the terms of the specifications, and should another pavement be forced upon them by the Executive Board the property owners could not be held by the city as being liable for their share of the costs. Consequently, the contract was awarded to the Warren Construction Company of Portland, Ore., for bitulithic.

Clay Products

AN artistic catalogue issued by the Robinson Clay Product Co., of Akron, Ohio, gives illustrations and data covering the varied manufactures turned out from these works. In addition to the standard article of pipes, in all sizes and types, the Company does an extensive business in architectural work, a rock face brick, known as "blue granite," being a specialty in this department. Paving and fire bricks, not forgetting the Company's hollow building blocks for cellars and foundations, go to make up an enumeration by no means exhausting the contents of this little volume.

The League of American Municipalities: Manufacturers Represented at the Toledo, O., Convention

ON the inside of front cover will be found an illustration of the two sanitary automatic street flushing machines, exhibited by the Sanitary Street Cleansing and Sprinkling Machine Company of St. Louis. These machines have been adopted and are now in regular service in the following cities: St. Louis, Mo., New Orleans, La., Worcester, Mass., East St. Louis, Ill., Belleville, Ill., Owensboro, Ky., Walla Walla, Wash., Cleveland, Ohio, Louisville, Ky., Kansas City, Mo., Oklahoma City, O. T., Fort Worth, Texas, San Francisco, Cal., Seattle, Wash., Tacoma, Wash., Denver, Col., Ogden, Utah, and Little Rock, Ark. The increased use of automatic flushing machines by the municipalities of the country is one of the most important developments in the street cleaning problem, and the interest shown in them by the city officials assembled at Toledo, together with the papers and discussions during the convention, serves to indicate that the next few years will witness a widespread extension of this system. Messrs. Anders looked after the interests of the company at Toledo, and distributed literature which included letters and reports from cities where their machines are in use. Mr. H. W. Anders is secretary of the company, and his activity in arousing interest in the subject of automatic street flushing is opening up a wide field for business.

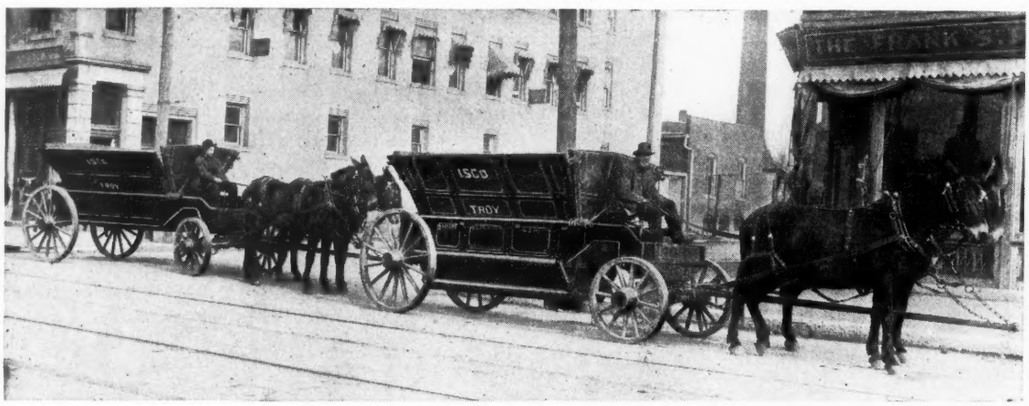
An improved sewer cleaning machine was shown by W. H. Stewart, of 333 Washington street, Boston. Mr. Stewart rents these machines to municipalities at the rate of $4 per day, or will sell the complete outfit for $750. Letters from public works departments in various sections of the country indicate that this machine is satisfactorily fulfilling the claims made for its efficiency.

Mr. E. E. Posey represented the American Street Flushing Machine Company, of St. Louis, and demonstrated the advantages of street cleaning by the flushing system. Machines of this make are in regular use in Toledo, and visitors were able to judge of their efficiency under these conditions.

Mr. J. M. Wright, of the Central Bitulithic Paving Company, of Detroit, had an interesting exhibit showing the ingredients and construction of Warren's bitulithic pavement. Many of the delegates at Toledo came from cities where this pavement is giving the best of satisfaction, and were thus able to substantiate the claims made for it.

The Tiffin Wagon Company, Tiffin, Ohio, exhibited its dump-wagon and dump-cart for street cleaning and general municipal work. Considerable interest was displayed by visitors in the various features of these appliances, which evidence much study of the problems to be met by their use.

Paving and sidewalk blocks were shown by the Logan Brick Manufacturing Company, of Toledo, Mr. A. A. Reilly, of this company, being a prominent figure at the convention. The plant



TROY DUMPING WAGONS EXHIBITED AT THE TOLEDO CONVENTION

The Troy Wagon Works Company, Troy, Ohio, exhibited wagons designed for contractors' and municipal work. The No. 8½ wagon, specially built for municipal purposes, is two feet longer than the contractors' wagon, and is equipped with hinged top sides which can be dropped to avoid high lifting or shoveling. All Troy wagons are made with solid steel axles, and the tops, sides and ends are protected with iron to prevent wear from shovels, etc. The ease with which the dumping mechanism is operated and the absence of all cumbersome or complicated parts have made these wagons very popular.

The Kelly-Springfield Road Roller Company, of Springfield, Ohio, was represented by Mr. G. E. Townsend, who was able to refer to a large number of municipalities now obtaining satisfactory and economical service through the ownership of Kelly-Springfield road rollers.

The Nelsonville Sewer Pipe Company, Nelsonville, Ohio, distributed an attractive circular, "Railway Connection with Street Paving," illustrating and describing the company's "filler" and "stretcher" brick for connecting car tracks with the paving of streets; this type of brick is being successfully used in a number of cities in Ohio, Indiana, Michigan and Wisconsin.

Machines for the manufacture of concrete blocks were shown in operation by the Winget Concrete Machine Company, Columbus, Ohio; the advantages of the Winget method were explained by Mr. A. T. Kramer.

is located at Logan, Ohio, where the company owns a large extent of excellent clay deposits.

The Republic Chemical & Creosoting Company, of Indianapolis, was represented by Russell & Jennison, its Toledo agents. Samples were shown of the well known Kreodone wood blocks. Part of Parkwood avenue, Toledo, was paved with this material in 1901, and it was also laid in 1904 on Monroe street, in one of the heavy traveled streets of the city. The board of public service has awarded contracts for wood paving this year.

Power Transmission

A HANDSOME 8vo book of 416 pages, in which paper, typography and binding compete with each other, has just been issued by the Dodge Manufacturing Company, whose main office and works are situate at Mishawaka, Indiana, with branches in several American and foreign cities. The New York office is at 43 and 45 Dey street.

The specialty of this firm lies in power transmission appliances, including every known device in the line of belting, shafting, vertical and horizontal bearings, split pulleys and sheaves; interchangeability has been carried far in the design of many of the firm's productions. A large part of the present catalogue is taken up by an exhaustive alphabetical code, reducing telegraphic necessities to a minimum. A selection of engineering tables and a good index add largely to the value of the work.

Exhibit Features at the New England Water Works Convention

CONSIDERABLE interest was shown by water-works men in the Hersey Detector Meter for fire services, made by the Hersey Manufacturing Company, South Boston, Mass. Mr. J. A. Tilden, manager, is the patentee. The device consists of an indicating check-valve in the fire service main, and a meter on a by-pass round it. There is no mechanism in the main pipe except the check-valve, which offers no objectionable resistance, and gives a practically unrestricted water-way for use in cases of fire. The device will accurately measure all leaks or ordinary small drafts, and also show if water has been used in very large quantities, giving an approximate idea of the length of such use. Mr. A. S. Glover, secretary of the Hersey Company, Mr. F. H. Smith, New York, manager, and Mr. W. H. Hersey were also present at the Convention.

The factory of the Neptune Meter Company, at Long Island City, was visited and inspected by a large number of water-works superintendents and others at the Convention. Mr. J. L. Wertz, Vice-President of the company, stated that it had been found necessary to largely increase the floor space in order to meet the growing demand for Trident water meters. The factor is equipped throughout with automatic and specially designed machinery, and tools of the very latest design.

Mr. W. H. Van Winkle, of the Water-Works Equipment Company, New York, exhibited an improved tapping machine which he furnishes in all sizes from 4-inch to 48-inch inclusive, the larger machines being operated by a gasoline engine if desired. A new type of hub sleeve was also shown, effecting an important saving of lead. The cities of Pittsburg and Trenton are already utilizing this improvement on contracts recently placed.

"Little Drops of Water" is the title of the booklet distributed by T. C. Clifford, General Sales Agent for the Pittsburg Meter Company, manufacturers of water meters in all sizes from ⅝-inch to 6-inch. To quote from the booklet: "A reliable water meter is the Water Department's most careful and conscientious inspector. Although always on duty, it never tires, doing its work noiselessly, accurately, and at a minimum of expense."

The water-works specialties of the H. Mueller Manufacturing Company, Decatur, Ill., and New York, were exhibited by O. B. Mueller and A. C. Pilcher, attention being called to the Columbia water pipe tapping machine, which can be used in any position on the pipe and in any ordinary ditch, no extra excavation being required.

The King vertical disc meter was the feature of the Union Water Meter Company's exhibit, which was in charge of F. L. Northrop, Sales Manager; Edward P. King, Treasurer, and Charles F. Merrill, Assistant Superintendent. The construction of this meter affords a compact and inexpensive setting in a vertical service pipe. The mechanism being in its normal position, neither sensibility nor durability is sacrificed.

Mr. Mark Dean, of the Central Foundry Company, 116 Nassau street, New York, demonstrated that joint-leakage in water mains can be overcome by the use of his "universal pipe." The immense saving which this means to municipalities can best be appreciated by those intimately connected with water-works departments.

The largest manufacturing representation at the Convention was that of the Allis-Chalmers Co., of Milwankee. Its pumping engines are in use throughout the country, and many of the water-works men present testified from personal experience to their superior character and high grade workmanship. The Milwaukee office was represented by Arthur Warren, Manager of the Publicity Department, and the New York office by L. C. Randall, Manager.

The Coffin Valve Co., Boston, showed sluice valves, service boxes, water crane and model hydrant, together with a large collection of photographs of special work which has been done for municipalities in every section, including the largest gate valve in the world, 12½ feet in diameter.

Curb boxes, McNamara hydrants and street washers and a general line of water-works specialties was the exhibit of the Hays Manufacturing Company, of Erie, Pa. Messrs. Nagle and French, of this company, stated that the constant growth and extension of its business have necessitated the building of a large new factory, which will nearly double their output capacity.

The Builders' Iron Foundry, Providence, R. I., manufacturers of the Venturi meter and d'Auria high-duty pumping engines, were represented by A. B. Coulters.

Mr. John C. Kelley, President, and John C. Kelley, Jr., Secretary, were present for the National Meter Company. In addition to the well known line of meters, the Company makes high grade gas and gasoline engines for electric lighting, pumping, fire protection, etc.

The Buckeye Heater, for melting lead out of pipe joints, is the specialty of Walter Macleod & Co., Cincinnati. Their latest device is a portable tar furnace for use in melting materials for street work, which is being used to good advantage by the city of Boston for street repair work. Wm. H. Fitch is in charge of the New York office, at 107 Liberty street.

The Thomson Meter Company, H. C. Folger, secretary, showed the Lambert water meter, together with a valuable screen improvement which protects the meter from all foreign matter, and which can be detached and cleaned without disconnecting the meter.

Worthington disc meters, piston meters and hot-water meters were exhibited by the house of Henry R. Worthington, which is always ready to furnish sample meters to water-works for trial.

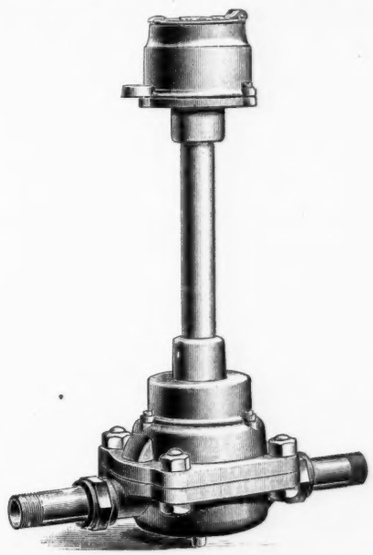
The Merrill sealing coupling for water meters, made by the F. E. Merrill Company, West Somerville Station, Boston, is the invention of a practical water-works superintendent and aims at preventing unauthorized persons from tampering with the meter.

The Garlock Packing Company, Palmyra, N. Y., was represented by F. S. Bulkley from the New York office.

Other exhibitors at the convention were the A. P. Smith Manufacturing Company, Newark, N. J.; R. D. Wood & Co., Philadelphia; Ross Valve Company, Troy, N. Y.; Rensselaer Manufacturing Company, Troy, N. Y.; Kennedy Valve Company, New York; Fairbanks Company, New York; Lead Lined Iron Pipe Company, Wakefield, Mass.

Dial Extensions for Water Meters

WHEN water meters outside of buildings are set in the ground or in sawdust to prevent freezing, some provision is required to secure access to the dial without the necessity of digging down to the meter. This is supplied by the extension dial, which can be placed at any elevation above the meter, restricted only by the length of pipe used. As no water enters the pipe, there is no danger of



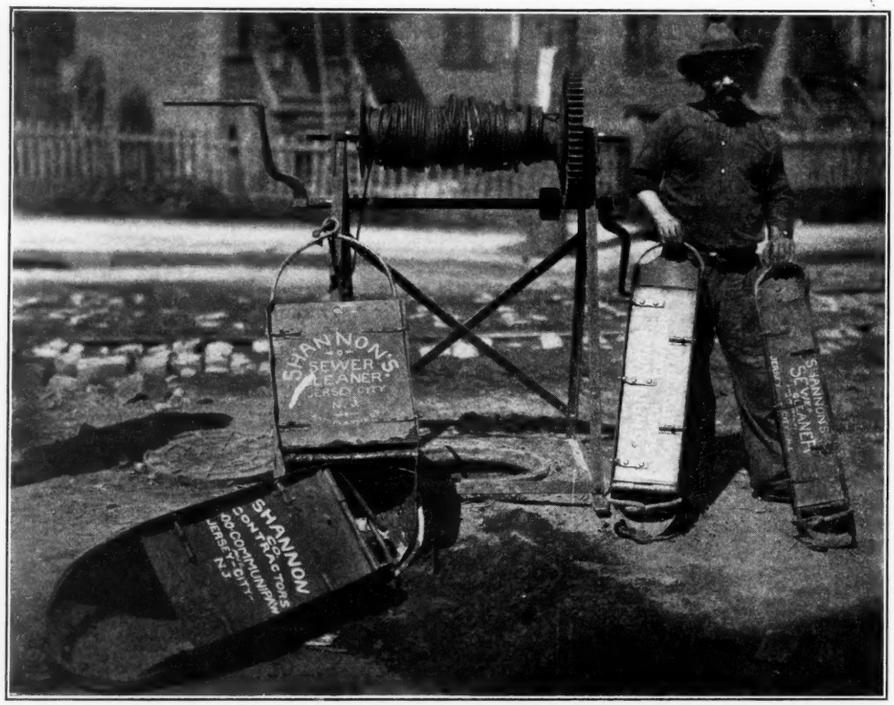
freezing. The length of the connection between the dial and the meter can be altered with the tools used in ordinary pipe work. These extensions, for all lengths and to fit all sizes of "American" or "Niagara" meters, are furnished by the Buffalo Meter Company, 290-296 Terrace, Buffalo, N. Y.

A Sewer Cleaning Device

The accompanying illustration refers to a new device for cleaning sewers, whereby the dirt is taken from the pipe and brought to the surface of the street without being handled. The invention of Mr. Robert Shannon, of J. H. & R. Shannon Co., contractors, 538 Bergen avenue, Jersey City, N. J., it has been used and proved a success in every way, fully justifying every claim made for it by the inventor. Engineers who have seen it work recommend its operation as the only modern way to clean sewers at a reasonable cost. The machine is simple in construction and operation, requires no high grade of skill or experience and no horses, and does not keep a gang of men standing around while the dirt is being taken out, three men being all that are required to operate it.

The machine will clean any size pipe or sewer down to a depth of three-eighths of an inch in the bottom, its construction being such that while the scoops cut into the deposit they easily ride over the joints or other inequalities in the sewer. The action is continuous, a three-eighths-inch wire cable, drawn through the sewer by a thin line, being actuated by the windlass, the machine operating at any desired distance from the manhole in use. An automatic swinging door attached to the scoop converts it into a closed bucket, and thus prevents loss of material in drawing the machine upwards to the street surface. As the largest size machine holds about thirty pails and the fifteen-inch size (shown in the illustration) about seventeen pails, there is an evident gain in time as compared with having to remove separate pailfuls.

At Roselle Park, N. J., where nine miles of sewers were cleaned with this machine at a depth of twenty-three feet, a length of 572 feet of fifteen-inch pipe, containing from six to twelve inches of deposit, was cleaned by three men in a day, an average of fourteen cartloads a day being removed. At Harrison, N. J., an average of nineteen loads a day was removed, and at Weehawken twelve truck loads a day were removed for five days.



THE SHANNON SEWER CLEANING MACHINE

Bad Paving Breeds Disease

The St. Louis "Daily News" of September 1 contains the following paragraph in regard to a macadam pavement in that city, in which the filling for sub-foundation was being made, in part, of sediment removed from a sewer. Chestnut street and Lindell boulevard are bitulithic pavements laid by the Granite Bituminous Paving Company:—

Residents of Park avenue and vicinity are indignant because sewer offal has been used in making the streets in that section. And not without good cause. There is not the least doubt that the use of such ingredients in street making is decidedly deleterious to health and might at any time result in an epidemic, particularly during this hot weather. But even that is not the only cause of complaint. The practice of throwing large stones on top of this refuse, then covering with a thin layer of earth and sand and running a roller over it does not make a good street, but is, on the contrary, a source of continual expense to keep it in repair. However, the residents on that section have the remedy in their own hands, and if they do not avail themselves of it they are not entitled to much sympathy. Let them call a meeting and insist that the streets should be paved with the same material as is on Chestnut street and Lindell boulevard. Those streets are things of beauty, smooth, even and easily kept clean, and they are, moreover, durable and can withstand all kinds of traffic. One has only to inspect those streets to be convinced that it is the most serviceable kind of paving either for residence or business sections, and until it is generally adopted complaints will be rife and discomfort prevalent.

Fire Department Equipment

Fire departments are being strengthened throughout the country, as shown by the orders received by one company during the past two or three weeks. In fire engines the greatest order came from New York, which requires four Metropolitan steamers and also an American-La France aerial truck. Four cities, Passaic, N. J., Rome, N. Y., Philadelphia, Pa., and Milwaukee, Wis., have each ordered one of the above mentioned trucks. Hook-and-ladder trucks have been ordered by Annapolis, Md., Saginaw, Mich., and Mendham, N. J., and also by Richland, Pa., which adds to its order a chemical engine. North Plainfield, N. J., Southbridge, Mass., Griffin, Ga., and Flint, Mich., have each ordered a combination wagon. Troy, N. Y., has ordered three engines rebuilt, and Baltimore, Md., Portsmouth, O., Albany, N. Y., Brattleboro, Vt., and Marblehead, Mass., have placed similar orders in respect of one engine each.

A Pure White Light

The Blair Light Company, of Northboro, Mass., to whose specialty we made an extended reference on page 142 of the Journal for September, has since issued a comprehensive catalogue, showing various forms and applications of the Automatic Lamp, the principles and operation of which are clearly explained in a few introductory pages. Those who had an opportunity of seeing this light at the Montreal Convention Exhibition will require no description of its advantages over ordinary methods of burning gasolene, but to others we may say that this is as truly a gas-burner as any lamp in the market, the gas being produced by the lamp itself instead of being supplied to it from an outside source. The resulting economy in oil and the superior quality of the light due to this cause and the adoption of the mantle system will be apparent to anyone reading the present attractive publication.